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SITE (Superfund Innovative Technology Evaluation) Program Demonstration Test. Terra Vac in situ Vacuum Extraction System, Groveland, Massachusetts. Volume 2

Foster Wheeler Enviresponse, Inc., Livingston, NJ

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TECHNOLOGY EVALUATION REPORT: SITE PROGRAM DEMONSTRATION TEST TERRA VAC IN SITU VACUUM EXTRACTION SYSTEM GROVELAND, MASSACHUSETTS

VOLUME II

RISK REDUCTION ENGINEERING LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
U. S. ENVIRONMENTAL PROTECTION AGENCY
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16. ABSTRACT

An evaluation was made of the performance of Terra Vac Inc.'s vacuum extraction system during a 56-day demonstration test run at Valley Manufactured Product Company's site in Groveland, Massachusetts. This site is part of the Groveland Wells Superfund site, a source of drinking water for the town of Groveland, and is contaminated mainly by trichloroethylene. The report includes a detailed discussion of the operations of the vacuum extraction unit, a process description and diagram of the system and a summary of the sampling and analytical protocols. The final sampling and analytical report prepared by the sampling and analytical contractor, including the quality assurance project plan, is an integral part of this document. An overall cost evaluation of the process is included and conclusions are drawn regarding the efficiency of the process and its applications to other Superfund sites across the country. Results of the demonstration test are promising, and it is felt that a site remediation can be accomplished using this technology. Both shallow soil gas and soil VOC concentrations showed a decline with time which was correlatable. The process worked well in soils of both high and low permeability. The system operation was very reliable during the 56 day demonstration test run and the only operation attention required was to replace the spent activated carbon canisters with fresh canisters.

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FOREWORD

The Superfund Innovative Technology Evaluation (SITE) program was authorized in the 1986 Superfund amendments. The program is a joint effort between EPA's Office of Research and Development and the Office of Solid Waste and Emergency Response. The purpose of the program is to assist the development of hazardous waste treatment technologies necessary to implement new cleanup standards which require greater reliance on permanent remedies. This is accomplished through technology demonstrations which are designed to provide engineering and cost data on selected technologies.

This project was a demonstration of Terra Vac Inc.'s in situ vacuum extraction process on the property of an operating machine shop. The property is part of the Groveland Wells Superfund Site in Groveland, Massachusetts. Information on the performance and cost of the process was obtained as the result of extensive field observations, data collection, and sampling and analytical work. This information may be employed in assessments at other sites. The documentation of the demonstration will consist of two reports. This Technology Evaluation Report describes the field activities and laboratory results. An Applications Analysis Report will follow and provide an interpretation of the data and conclusions on the applicability of the technology.

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ABSTRACT

An evaluation was made of the performance of Terra Vac Inc.'s vacuum extraction system during a 56-day demonstration test run at Valley Manufactured Product Company's site in Groveland, Massachusetts. This site is part of the Groveland Wells Superfund site, a source of drinking water for the town of Groveland, and is contaminated mainly by trichloroethylene.

The report includes a detailed discussion of the operations of the vacuum extraction unit, a process description and diagram of the system, and a summary of the sampling and analytical protocols. The final sampling and analytical report prepared by the sampling and analytical contractor, including the quality assurance project plan, is an integral part of this document. An overall cost evaluation of the process is included and conclusions are drawn regarding the efficiency of the process and its applications to other Superfund sites across the country.

Results of the demonstration test are promising, and it is felt that a site remediation can be accomplished using this technology. Both shallow soil gas and soil VOC concentrations were reduced substantially and wellhead VOC gas concentrations showed a decline with time, which was correlatable. The process worked well in soils of both high and low permeability.

The system operation was very reliable during the 56-day demonstration test run, and the only operation attention required was to replace the spent activated carbon canisters with fresh canisters.

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* Volume I is the evaluation of the technology and includes an Executive Summary as well as sections on the description of the process, the sampling and analysis program, the performance data and evaluation and economics.

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ABBREVIATIONS AND SYMBOLS

API	American Petroleum Institute
ASTM	American Society for Testing and Materials
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm/sec	centimeters per second
cu ft	cubic feet
cu yd	cubic yard
DCE	trans 1,2-dichloroethylene
ECD	electron capture detector
EPA	Environmental Protection Agency
EW	extraction well
FID	Flame ionization detector
GC/MS	Gas Chromatograph/Mass Spectrometer
g/ml	grams per milliliter
gmol	gram mole
GPM	gallons per minute
in Hg	inches of mercury
KPa	kilopascal
Kw	kilowatt
m/sec	meters per second
MeCl	methylene chloride
mg/kg	milligrams per kilogram
mg/l	milligrams per liter
MW	monitoring well
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List

ABBREVIATIONS AND SYMBOLS (cont.)

OLM	Organic Leachate Model
ORD	Office of Research and Development
OSHA	Occupational Safety and Health Act
OSWER	Office of Solid Waste and Emergency Response
PAHs	Polycyclic Aromatic Hydrocarbons
ppb	parts per billion
ppm	parts per million
ppmv	parts per million by volume
ppmw	parts per million by weight
psi	pounds per square inch
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RREL	Risk Reduction Engineering Laboratory
SARA	Superfund Amendments and Reauthorization Act of 1986
SCFM	standard cubic feet per minute
SITE	Superfund Innovative Technology Evaluation Program
TCE	trichloroethylene
TCLP	Toxicity Characteristic Leaching Procedure
TOC	Total Organic Carbon
TRI	1,1,1-trichloroethane
u	micron
ug/l	micrograms per liter
VOC	Volatile Organic Compound
VHS	Vertical and Horizontal Spread Model

CONVERSIONS

	English (US)	Metric (SI)
Area:	1 ft^2	9.2903×10^{-3} m^2
	1 in^2	6.4516 cm^2
Flow Rate:	1 gal/min	6.3090×10^{-5} m^3/s
	1 gal/min	6.3090×10^{-2} L/s
	1 Mgal/d	43.8126 L/s
	1 Mgal/d	3.7854×10^{3} m^3/d
	1 Mgal/d	4.3813×10^{-2} m^3/s
Length:	1 ft	0.3048 m
	1 in	2.54 cm
	1 yd	0.9144 m
Mass:	1 lb	4.5359×10^{-2} g
	1 lb	0.4536 kg
Volume:	1 ft^3	28.3168 L
	1 ft^3	2.8317×10^{-2} m^3
	1 gal	3.7854 L
	1 gal	3.7854×10^{-3} m^3

ft = foot, ft^2 = square foot, ft^3 = cubic foot
in = inch, in^2 = square inch
yd = yard
lb = pound
gal = gallon
gal/min = gallons per minute
Mgal/d = million gallons per day
m = meter, m^2 = square meter, m^3 = cubic meter
cm = centimeter, cm^2 = square centimeter
L = liter
g = gram
kg = kilogram

m^3/s = cubic meters per second

L/s = liters/sec

m^3/d = cubic meters per day

ACKNOWLEDGMENTS

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This report was prepared for EPA's Superfund Innovative Technology Evaluation (SITE) Program by Peter A. Michaels of Foster Wheeler Enviresponse, Inc. for the U.S. Environmental Protection Agency under Contract No. 68-03-3255.

SECTION 1

INTRODUCTION

Alliance Technologies Corporation was subcontracted by Enviresponse, Inc. to conduct sampling and analysis during the Terra-Vac In-situ Vacuum Extraction Project in Groveland, Massachusetts. The Terra-Vac process was demonstrated and tested under the U.S. Environmental Protection Agency's (EPA's) Superfund Innovative Technology Evaluation (SITE) program.

The major objectives of the demonstration were: 1) determine the ability of the technology to reach an acceptable low level of contaminant concentration in the soil; 2) to assess the effectiveness in various soil types; 3) to gather capital and operating costs; and 4) to gain performance and reliability information. A secondary objective was to establish a correlation between volatile organic concentrations in soils and concentration in extracted vapor. ← ? con't on pg 2

The site selected for this demonstration was the Valley Manufactured Products facility in Groveland, Massachusetts. The Valley site is the location of an operating machine shop which manufactures valves, screws, and other industrial products. Soil contamination at the site is apparently the result of an underground storage tank leak and improper disposal of various chlorinated solvents used at the machine shop.

The geology of the site can be basically described as three distinct zones. Glacial till is overlain by a regional variable silty, clay lens. This clay lens may be acting as a barrier in preventing contamination from entering the glacial till. An upper sand zone consisting of top soil, fill (as evidenced by brick and cinders), and outwash sands have been shown to be contaminated with various concentrations of methylene chloride (MeCl), 1,2-trans-dichloroethylene (DCE), 1,1,1-trichloroethane (TRI), trichloroethylene (TCE) and tetrachloroethylene (PCE).

Alliance's role during this program was to conduct the field sampling and analytical work. Alliance established an onsite laboratory equipped with a GC/FID and GC/ECD and other support equipment. As well as being a center for all data gathering during the demonstration, this onsite lab also allowed for very short holding times for the analyses of process and soil gas samples (24-48 hours). Analysis of soil borings, process liquids and carbon was conducted at the Alliance Analytical Laboratory in Bedford, Massachusetts.

The following sections of this report summarize Alliance's contribution to the program. The report has been organized into three volumes. Volume I contains the bulk of the study results and has been subdivided as follows. Section I contains an Introduction which summarizes the project objectives. Section 2, Project Summary describes a chronology of project activities and details the project scope of work Section 3, Results presents a compiliation, in summary form, of all results obtained during the program. Section 4, presents the Quality Assurance/Quality Control procedures followed and results obtained. The remainder of this volume contains Appendices A through H which includes all analytical data, process parameters and the SOP's for process and soil gas analysis.

Volume II, Field Data Sheets, contains copies of the original daily sample data sheets which were used to record process conditions and sampling information. In addition, copies of the chain-of-custody sheets used during the project are also included. Volume III, Daily Sample Log, contains the daily log book used to record project activity at the site.

SECTION 2

PROJECT SUMMARY

PROJECT BRIEF

On July 7, 1987, Alliance Technologies Corporation was awarded the sampling and analysis portion of the Terra Vac, Inc. In-situ Vacuum Extraction Technology SITE Demonstration Project to be conducted at the Valley Manufactured Products site in Groveland, Massachusetts. Alliances role in this project involved providing sampling and analytical support before, during and after the active treatment phase of the demonstration project.

Shortly after the project award date, a project kick off meeting was held on August 13, 1987 at Terra-Vac's Tampa Florida office. At the meeting, the overall project scope and logistical considerations were discussed. One specific topic involved the length of time for the Active Treatment phase. Initially, Active Treatment was to involve 14-days of continuous operation during which volatiles would be stripped from in-situ soils. It was decided, however, that a 14-day period would not be sufficient to fully demonstrate the effectiveness of the process. It was therefore decided to increase the active treatment phase to 28 days. Ultimately it was decided to extend the active treatment period to 56 days.

Preparation of the Quality Assurance Project Plan followed and Revision 0 was submitted on September 1, 1987. Revision 1 to the QAPP was submitted on October 10, 1987.

The field program was originally scheduled to start on October 5, 1987, but a series of delays postponed field activities until November 1987. This initial delay was caused primarily by problems encountered with scheduling the pretreatment drilling contractor.

The following is a presentation of the chronology of field activities from mobilization through demobilization:

November 1987 - Site mobilization
December 1-14, 1987 - Pretreatment soil borings and well installation
December 11-15, 1987 - Pretreatment shallow soil gas samples
December 16-18, 1987 - Well commissioning
Dec. 18 - Jan. 7, 1988 - Operations suspended due to holidays
January 7, 1988 - Commissioning continues
January 8-15, 1988 - Active treatment
January 15, 1988 - Treatment aborted
Jan. 15-Feb. 10, 1988 - System redesigned
February 11, 1988 - Active treatment Phase 1, day 1
February 26, 1988 - Separator pump malfunction, system off
February 29, 1988 - Pump repaired, system on
March 11, 1988 - System off for Mid-Treatment
March 14-16, 1988 - Soil boring program
March 15-17, 1988 - Shallow soil gas samples collected
March 18, 1988 - System on, active treatment Phase 2
April 4, 1988 - Separator pump malfunction, system off
April 5, 1988 - Pump repaired, system on
April 18, 1988 - System off - post treatment
April 19-26, 1988 - Soil boring program
April 19-22, 1988 - Shallow soil gas samples collected
April 26-29, 1988 - Site Demobilization

PROJECT SCOPE

The field portion of this program was broken down into six distinct phases. These phases were:

Pretreatment
Commissioning
Active Treatment 1
Mid-Treatment
Active Treatment 2
Post Treatment

During Pretreatment, Terra Vac installed the extraction wells (EW 1-4), the vacuum monitoring wells (VMW 1-4), and assembled the vacuum extraction system. Continuous split spoon soil samples were collected from each of the eight borings and analyzed for TCLP (ZHE), purge and trap volatiles, head space volatiles, pH, TOC, and oil and grease. In addition, Alliance arranged to have two additional borings completed for collection and analysis of engineering parameters.

During Commissioning, process and soil gas samples were collected from each of the extraction wells and process sampling points. Soil gas samples were also collected using shallow bar-punch probes and from the shallow and deep monitoring well points. All samples were analyzed onsite for the specified volatile organic compounds. Samples of the separator drain water were also collected for volatiles analysis.

Active Treatment (Active Treatment 1 and 2) involved collecting process gas samples, separator waters, and spent activated carbon samples during the 56-day period that the Terra-Vac unit was in operation actively extracting volatiles from the in-situ soil matrix. Gas samples were collected from each of the extraction and monitoring wells, the separator inlet, the primary carbon outlet and secondary carbon outlet. These samples were analyzed onsite for selected volatile organics. Separator water and spent activated carbon samples were collected whenever the separator tank was scheduled for pick-up and when the carbon units were taken off line respectively. Process parameters were also measured during each day of active treatment. These parameters included moisture at the separator inlet, monitoring well vacuum, process flows, process gas stream temperature, ambient temperature and barometric pressure.

Mid-Treatment was conducted at the half way point of Active Treatment (between Active Treatment 1 and 2). The purpose of the Mid-Treatment was to assess the effectiveness of the Terra Vac system at the mid point of the Active Treatment phase. During Mid-Treatment, four soil borings were drilled and soil samples collected for analysis. Analytical parameters were identical to those for Pretreatment soil samples. Shallow soil gas samples were also collected as in Pretreatment.

Post Treatment was conducted at the completion of Active Treatment 2. During Post Treatment, eight (8) borings were advanced and samples collected for the identical parameters analyzed during Pre and Mid-Treatment. As before, shallow soil gas samples were collected and analyzed. Two additional engineering borings were also advanced and analyzed for the physical parameters outlined in Pretreatment.

Figures 2-1, 2-2, and 2-3 illustrate the locations of all extraction wells and boreholes, the shallow bar punch locations and the process gas stream locations sampled during commissioning and pre, mid, and post treatment.

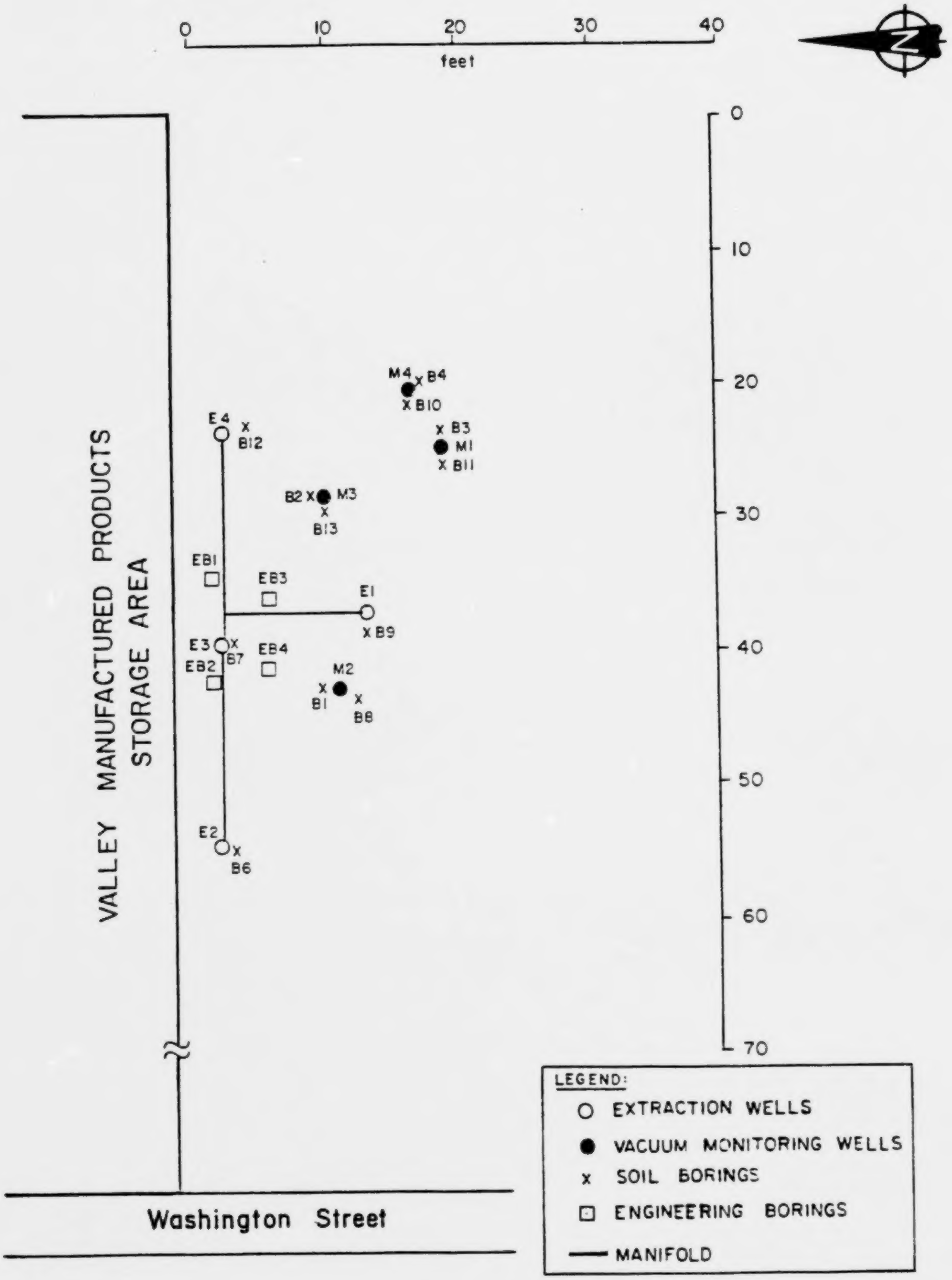


Figure 2-1. Soil borings.

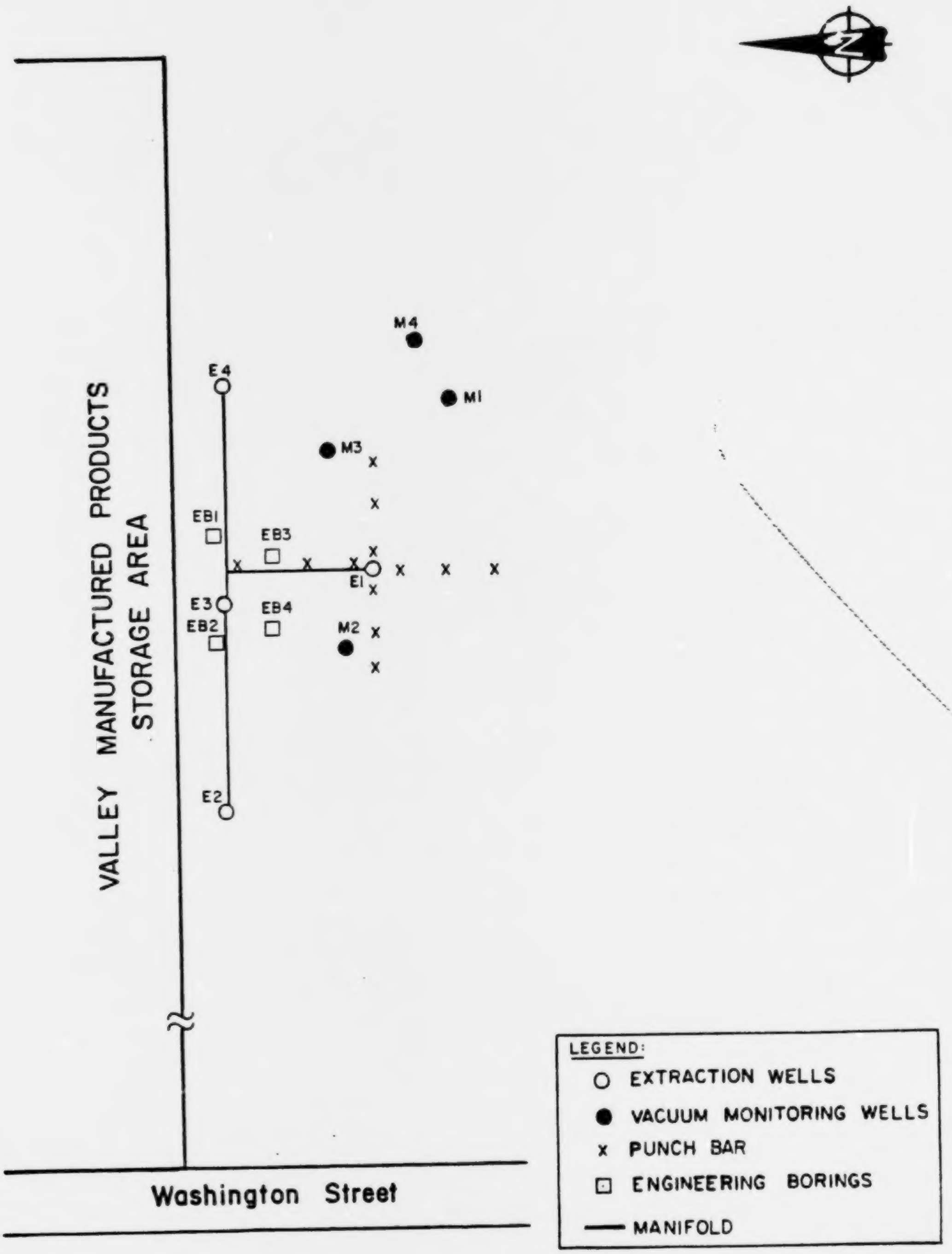


Figure 2-2. Shallow Soil Gas Monitoring locations.

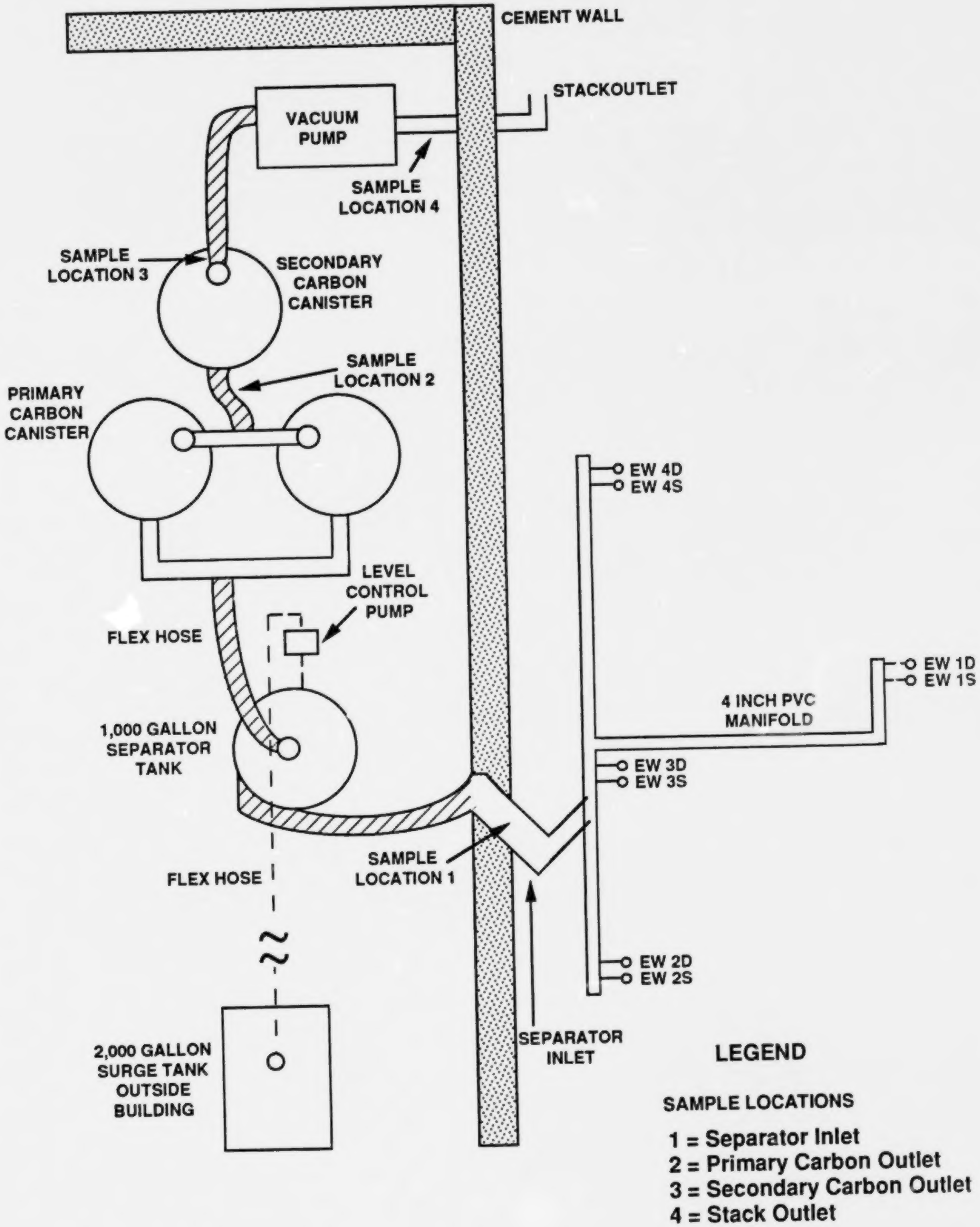


Figure 2-3. Process schematic.

Figure 2-1, Soil Borings, shows the locations of the extraction wells, monitoring wells and engineering borings. Figure 2-2, Shallow Soil Gas Monitoring Locations, illustrates the locations of the bar punch probe sampling locations and the gas monitoring wells with respect to extraction Well No. 1 (E1). Figure 2-3, Process Schematic provides an illustration of the Terra-Vac system as it was configured for the majority of the project and also indicates the locations of all process gas stream sampling points. These locations, as indicated in the schematic, are as follows:

Sample Location 1 - Separator Inlet;
Sample Location 2 - Primary Carbon Outlet;
Sample Location 3 - Secondary Carbon Outlet; and
Sample Location 4 - Stack Outlet.

For a detailed discussion of the samples collected and analysis conducted during each of the sampling phases, refer to the Quality Assurance Project Plan (Revision 1) entitled, Sampling and Analysis - Terra Vac, Inc. In situ Vacuum Extraction Technology SITE Demonstration Project, Valley Manufactured Products Site, Groveland, Massachusetts, October 7, 1987.

SECTION 3

RESULTS SUMMARY

GENERAL

This section contains a summary of the analytical data obtained during the course of the project consolidated in the form of the following tables and figures.

Tables 3-1a - 3-1h	Soil Borings Comparison Tables
Figures 3-1a - 3-1f	Soil Borings: TCE vs. Depth
Figures 3-2a - 3-2t	Well Head Gas Concentration
Figures 3-3a - 3-3c	Shallow Soil Gas Plots
Table 3-2	Separator Water Analytical Results
Table 3-3	Carbon Canister Analytical Results

Due to the quantity of data generated during the project, complete data tables are not included in this section. Tables containing all analytical results, recordings and measurements are included in the Appendices to Volume I of this report.

SOIL BORINGS COMPARISON TABLES

Three separate sets of soil borings were conducted during the course of this project (Figure 2-1). Each boring set coincided with the project phases of Pre-, Mid, and Post Treatment. Pretreatment borings were advanced and samples collected to establish baseline contamination levels across the site. Extraction wells and vacuum monitoring wells were then completed in these boreholes.

Mid-Treatment boreholes were advanced in close proximity to existing vacuum monitoring wells. Samples were collected and analyzed to establish amount of "clean up" to that point in time. Post treatment boreholes were advanced in close proximity to all extraction and vacuum monitoring wells. Samples were again collected and analyzed to establish amount of "clean up" achieved during the demonstration.

Tables 3-1a through 3-1h are presented as comparison tables; in other words, the analytical results from the three soil boring programs (i.e., pre-, mid and post treatment) are presented in a location by location basis. For example, all the GC/MS P&T, Headspace, and TCLP data for Pre, Mid and Post Treatment drilling for vacuum monitoring Well #1 are presented on one table so that a comparison can be easily made and trends readily established.

The various quantitation limits for GC/MS purge and trap, TCLP extracts and GC soil headspace respectively for Pre, Mid, and Post Treatment are as follows:

GC/MS Purge and Trap-- The quantitation limit varies depending on the individual sample weight and moisture content. The typical range observed for the three phases of the program are:

Pretreatment	0.94-2.4 mg/kg
Mid-Treatment	1.2 -2.0 mg/kg
Post Treatment	1.1 -1.6 mg/kg

GC/MS TCLP Extracts - The quantitation limit observed was the same for all three phases of the program.

Pretreatment	0.05 mg/L
Mid-Treatment	0.05 mg/L
Post Treatment	0.05 mg/L

GC Soil Headspace - The quantitation limit varies depending on the individual sample weight and moisture content. The typical range observed for the three phases of the program are as follows:

			(mg/kg)		
	MeCl	DCE	TRI	TCE	PCE
Pretreatment	(1.40-4.44)	(1.12-3.53)	(1.40-4.44)	(1.40-4.44)	(1.40-4.44)
Mid-Treatment	(0.79-2.07)	(1.58-4.10)	(7.99-20.7)	(7.99-20.7)	(7.99-20.7)
Post Treatment	(1.30-3.24)	(0.65-1.63)	(0.87-2.16)	(0.68-1.69)	(1.29-3.22)

TABLE 3-1A. ANALYTICAL DATA FROM SOIL BORINGS: COMPARISON TABLE/EXTRACTION WELL #1 - PRETREATMENT, POST TREATMENT

Sample Ider 'icat Number	Soil Depth	GC/MS Concentrations (mg/Kg)					Headspace Concentrations (mg/kg)					TCLP (mg/l)				
		MeCl	DCE	TRI	TCE	PCE	MeCl	TCE	TRI	TCE	PCE	MeCl	DCE	TRI	TCE	PCE
EWS1/1	0-2	<5.0	ND	ND	ND	ND	NR	-	-	-	-	NR	-	-	-	-
EWS1/2	2-4	<5.0	ND	ND	ND	ND	NR	-	-	-	-	NR	-	-	-	-
EWS1/3	4-6	<5.0	2.11	ND	61.0	2.22	ND	6.94	1.22	198.20	2.92	TRACE	TRACE	ND	0.370	ND
EWS1/4	6-8	<5.0	2.03	ND	328.00	8.31	ND	6.40	2.39	392.11	2.03	TRACE	ND	ND	0.138	ND
EWS1/5	8-10	<5.0	ND	ND	4.27-12.5	ND-3.6	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
EWS1/6	10-12	<5.0	ND	ND	3.06	2.05	ND	ND-3.05	ND	ND-68.58	ND	TRACE	ND	ND	ND	ND
EWS1/7	12-14	<5.0	ND	ND	3.15	ND	ND	6.40	1.53	93.76	2.12	TR-0.13	ND	ND	ND	ND
EWS1/8	14-16	<5.0	ND	ND	ND	ND	ND	TRACE	TRACE	29.52	ND	TR-0.076	ND	ND	ND	ND
EWS1/9	16-18	<5.0	ND	ND	ND	ND	ND	TRACE	TRACE	41.93	TRACE	TRACE	ND	ND	ND	ND
EWS1/10	18-20	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	ND	ND	ND
EWS1/11	20-22	<5.0	ND	ND	ND	ND	ND	TRACE	TRACE	7.60	ND	TRACE	ND	ND	ND	ND
EWS1/12	22-24	<5.0	ND	ND	ND	1.28	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
B9/1	0-2	<5.0	1.70	ND	3.60	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
B9/2	2-4	<5.0	1.40	ND	7.70	ND	ND	3.20	ND	9.10	TRACE	0.34(B)	TRACE	ND	0.20	ND
B9/3	4-6	<5.0	ND	ND	13	ND	ND	2.10	ND	9.50	ND	1.30(B)	ND	ND	0.13	ND
B9/4	6-8	1.4(B)	ND	ND	TRACE	ND	ND	ND	ND	TRACE	ND	1.4(B)	ND	ND	TRACE	ND
B9/5	8-10	<5.0	ND	ND	22	ND	ND	ND	ND	5.80	TRACE	TRACE	ND	ND	0.071	ND
B9/6	10-12	<5.0	ND	ND	240	6.6	ND	2.60	ND	134.00	1.30	TRACE	ND	ND	1.2	ND
B9/7	12-14	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	0.59(B)	ND	ND	TRACE	ND
B9/8	14-16	<5.0	ND	ND	24	ND	NR	-	-	-	-	TRACE	ND	ND	0.77	ND
B9/9	16-18	<5.0	ND	ND	5.4	ND	ND	TRACE	ND	10.30	TRACE	TRACE	ND	ND	TRACE	ND
B9/10	18-20	<5.0	ND	ND	36	ND	ND	TRACE	ND	32.50	TRACE	TRACE	ND	ND	ND	ND
B9/11	20-22	NR	-	-	-	-	NR	-	-	-	-	NR	-	-	-	-
B9/12	22-24	NR	-	-	-	-	NR	-	-	-	-	NR	-	-	-	-

Boring #9 was located adjacent to extraction well #1

(B) - Suspected lab contamination
ND - Not Detected

TABLE 3-1B. ANALYTICAL DATA FROM SOIL BORINGS: COMPARISON TABLE/EXTRACTION WELL #2 - PRETREATMENT, POST TREATMENT

Sample Identificat Number	Soil Depth	GC/MS Concentrations (mg/Kg)					Headspace Concentrations (mg/kg)					TCLP (mg/l)				
		MeCl	DCE	TRI	TCE	PCE	MeCl	DCE	TRI	TCE	PCE	MeCl	DCE	TRI	TCE	PCE
EWS2/1	0-2	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	TRACE	ND	ND	ND	ND
EWS2/2	2-4	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	TRACE	ND	ND	ND	ND
EWS2/3	4-6	<5.0	ND	ND	ND	ND	ND	7.44	TRACE	27.61	TRACE	TRACE	ND	ND	ND	ND
EWS2/4	6-8	<5.0	ND	ND	2.99	ND	ND	TRACE	ND	1.81	ND	TRACE	ND	ND	ND	ND
EWS2/5	8-10	<5.0	ND	ND	13.60	ND	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	ND
EWS2/6	10-12	<5.0	ND	ND	5.36	ND	ND	TRACE	ND	TRACE	ND	0.054(B)	ND	ND	ND	ND
EWS2/7	12-14	<5.0	ND	ND	3.62	ND	NR	-	-	-	-	NR	-	-	-	-
EWS2/8	14-16	<5.0	ND	ND	9.54	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
EWS2/9	16-18	<5.0	ND	ND	ND	ND	ND	TRACE	ND	10.08	ND	TRACE	ND	ND	ND	ND
EWS2/10	18-20	<5.0	ND	ND	ND	ND	ND	2.06	ND	14.21	ND	TRACE	ND	ND	TRACE	ND
EWS2/11	20-22	<5.0	ND	ND	5.45	ND	ND	ND	ND	TRACE	ND	TR-0.093	ND	ND	ND	ND
EWS2/12	22-24	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	ND	ND	ND
B6/1	0-2	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	TRACE	ND	ND	ND	ND
B6/2	2-4	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	TRACE	ND	ND	TRACE	ND
B6/3	4-6	<5.0	TRACE	ND	TRACE	ND	ND	TRACE	ND	TRACE	ND	TRACE	ND	ND	ND	ND
B6/4	6-8	NR	-	-	-	-	NR	-	-	-	-	NR	-	-	-	-
B6/5	8-10	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
B6/6	10-12	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
B6/7	12-14	NR	-	-	-	-	NR	-	-	-	-	NR	-	-	-	-
B6/8	14-16	NR	-	-	-	-	NR	-	-	-	-	0.55(B)	ND	ND	ND	ND
B6/9	16-18	<5.0	ND	ND	23	ND	ND	TRACE	ND	17.42	ND	0.80(B)	ND	ND	TRACE	ND
B6/10	18-20	<5.0	ND	ND	5.30	ND	ND	TRACE	ND	17.05	TRACE	TR-1.0(B)	ND	ND	ND	ND
B6/11	20-22	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	1.50(B)	ND	ND	ND	ND
B6/12	22-24	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND

Boring #6 was located adjacent to extraction well #2

TABLE 3-1C. ANALYTICAL DATA FROM SOIL BORINGS: COMPARISON TABLE/EXTRACTION WELL #3 - PRETREATMENT, POST TREATMENT

Sample Identificat Number	Soil Depth	GC/MS Concentrations (mg/Kg)					Headspace Concentrations (mg/kg)					TCLP (mg/l)				
		MeCl	DCE	TRI	TCE	PCE	MeCl	DCE	TRI	TCE	PCE	MeCl	DCE	TRI	TCE	PCE
EWS3/1	0-2	<5.0	ND	ND	ND-2.77	ND	TRACE	3.66	TRACE	71.87	TRACE	TRACE	ND	ND	ND	ND
EWS3/2	2-4	<5.0	ND	ND	15.40	ND	ND	1.19	TRACE	67.17	TRACE	TRACE	ND	ND	ND	ND
EWS3/3	4-6	<5.0	ND	ND	50.50	2.10	ND	TRACE	TRACE	109.08	2.12	TRACE	ND	ND	ND	ND
EWS3/4	6-8	<5.0	ND	ND	6.41	ND	ND	TRACE	TRACE	70.53	TRACE	TRACE	ND	ND	0.185	ND
EWS3/5	8-10	<5.0	ND	ND	2.64	ND	ND	ND	ND	1.70	ND	0.069(B)	ND	ND	ND	ND
EWS3/6	10-12	<5.0	ND	ND	4.90	ND	ND	TRACE	ND	15.98	ND	0.057(B)	ND	ND	TRACE	ND
EWS3/7	12-14	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.050(B)	ND	ND	ND	ND
EWS3/8	14-16	<5.0	ND	ND	ND	ND	ND	TRACE	ND	7.37	TRACE	0.054(B)	ND	ND	ND	ND
EWS3/9	16-18	<5.0	ND	ND	ND	ND	ND	TRACE	ND	11.53	1.36	TRACE	ND	ND	ND	ND
EWS3/10	18-20	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
EWS3/11	20-22	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	ND	ND	ND
EWS3/12	22-24	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
B7/1	0-2	<5.0	ND	ND	ND	ND	ND	ND	ND	1.27	TRACE	TRACE	ND	ND	TRACE	ND
B7/2	2-4	<5.0	ND	ND	2.40	ND	ND	TRACE	ND	9.26	TRACE	TRACE	ND	ND	TRACE	ND
B7/3	4-6	<5.0	ND	ND	45.0	ND	ND	TRACE	ND	11.00	TRACE	TRACE	ND	ND	0.28	ND
B7/4	6-8	<5.0	ND	ND	19.0	ND	ND	TRACE	ND	18.00	ND	TRACE	ND	ND	0.44	ND
B7/5	8-10	<5.0	ND	ND	6.0	ND	ND	TRACE	ND	TRACE	ND	TRACE	ND	ND	0.05	ND
B7/6	10-12	<5.0	ND	ND	12	TRACE	ND	TRACE	ND	5.20	TRACE	0.43(B)	ND	ND	0.13	ND
B7/7	12-14	<5.0	ND	ND	16	ND	ND	TRACE	ND	2.30	ND	0.88(B)	ND	ND	0.23	ND
B7/8	14-16	<5.0	ND	ND	TRACE	ND	ND	TRACE	ND	2.00	ND	1.50(B)	ND	ND	ND	ND
B7/9	16-18	<5.0	ND	ND	5.90	ND	ND	1.20	TRACE	8.70	ND	TRACE	ND	ND	0.16	ND
B7/10	18-20	<5.0	ND	ND	12	ND	ND	TRACE	ND	6.30	ND	0.73(B)	ND	ND	TRACE	ND
B7/11	20-22	<5.0	2.50	ND	33	ND	ND	TRACE	ND	4.10	ND	TRACE	ND	ND	0.15	ND
B7/12	22-24	<5.0	ND	ND	TRACE	ND	ND	TRACE	ND	5.80	ND	TRACE	ND	ND	ND	ND

Boring #7 was located adjacent to extraction well #3

TABLE 3-1D. ANALYTICAL DATA FROM SOIL BORINGS: COMPARISON TABLE/EXTRACTION WELL #4 - PRETREATMENT, POST TREATMENT

Sample Identificat Number	Soil Depth	GC/MS Concentrations (mg/Kg)					Headspace Concentrations (mg/kg)					TCLP (mg/l)				
		MeCl	DCE	TRI	TCE	PCE	MeCl	DCE	TRI	TCE	PCE	MeCl	DCE	TRI	TCE	PCE
EWS4/1	0-2	<5.0	ND	ND	2.94	ND	ND	TRACE	ND	2.78	TRACE	TRACE	ND	ND	ND	ND
EWS4/2	2-4	<5.0	ND	ND	29.90	ND-8.69	ND	ND	ND	TRACE	ND	TRACE	ND	ND	ND	ND
EWS4/3	4-6	<5.0	ND-2.16	ND	260.00	13.50	ND	2.16	TRACE	127.31	TR-3.38	TRACE	ND	ND	0.264	ND
EWS4/4	6-8	<5.0	ND	ND	303.00	8.80	ND	11.11	1.97	649.58	13.59	TRACE	ND	ND	ND	ND
EWS4/5	8-10	<5.0	ND	ND	351.00	11.50	ND	TRACE	TRACE	68.17	1.86	TRACE	ND	ND	ND	ND
EWS4/6	10-12	<5.0	ND	ND	195.00	6.62	ND	TRACE	TRACE	141.47	2.39	ND	ND	ND	ND	ND
EWS4/7	12-14	<5.0	ND	ND	3.14	ND	ND	TRACE	TRACE	98.48	TRACE	TRACE	ND	ND	TRACE	ND
EWS4/8	14-16	<5.0	ND	ND	ND-1.97	ND	ND	ND	ND	ND-1.97	ND	TRACE	ND	ND	ND	ND
EWS4/9	16-18	<5.0	ND	ND	ND	ND	ND	TRACE	ND	1.56	ND	TRACE	ND	ND	ND	ND
EWS4/10	18-20	<5.0	ND	ND	ND	ND	ND	TRACE	ND	3.83	ND	TRACE	ND	ND	ND	ND
EWS4/11	20-22	<5.0	ND	ND	ND	ND	ND	TRACE	ND	2.53	ND	TRACE	ND	ND	ND	ND
EWS4/12	22-24	<5.0	ND	ND	6.71	ND	ND	TRACE	ND	4.43	TRACE	TRACE	ND	ND	ND	ND
B12/1	0-2	8.7	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	TRACE	ND	ND	0.01	ND
B12/2	2-4	6.7	ND	ND	ND	ND	ND	1.90	ND	1.40	ND	TRACE	0.09	ND	0.013	ND
B12/3	4-6	8.6	4.9	ND	39	1.80	ND	TRACE	ND	6.20	ND	1.9	ND	ND	0.09	ND
B12/4	6-8	<5.0	TRACE	ND	9.0	1.10	ND	1.80	ND	11.00	ND	TRACE	ND	ND	0.10	ND
B12/5	8-10	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
B12/6	10-12	6.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.34(B)	ND	ND	ND	ND
B12/7	12-14	<5.0	ND	ND	2.30	ND	ND	TRACE	ND	ND	ND	TRACE	ND	ND	ND	ND
B12/8	14-16	<5.0	ND	ND	ND	ND	ND	TRACE	ND	2.30	ND	0.28(B)	ND	ND	TRACE	ND
B12/9	16-18	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	0.37(B)	ND	ND	ND	ND
B12/10	18-20	<5.0	ND	ND	ND	ND	ND	TRACE	ND	1.95	ND	TRACE	ND	ND	ND	ND
B12/11	20-22	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
B12/12	22-24	<5.0	ND	ND	TRACE	ND	ND	TRACE	ND	ND	ND	TRACE	ND	ND	ND	ND

Boring #12 was located adjacent to extraction well #4

TABLE 3-1E. ANALYTICAL DATA FROM SOIL BORINGS: COMPARISON TABLE/MONITORING WELL #1 - PRETREATMENT, MID-TREATMENT, POST TREATMENT

Sample Identificat Number	Soil Depth	GC/MS Concentrations (mg/Kg)					Headspace Concentrations (mg/kg)					TCLP (mg/l)				
		MeCl	DCE	TRI	TCE	PCE	MeCl	DCE	TRI	TCE	PCE	MeCl	DCE	TRI	TCE	PCE
MWS1/1	0-2	<5.0	ND	ND	ND	ND	TRACE	TRACE	ND	TRACE	ND	TRACE	ND	ND	ND	ND
MWS1/2	2-4	<5.0	ND	ND	13.40	ND	ND	TRACE	ND	TRACE	ND	TRACE	ND	ND	ND	ND
MWS1/3	4-6	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	ND	ND	ND	ND	ND
MWS1/4	6-8	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	TRACE	ND	ND	ND	ND
MWS1/5	8-10	8	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	TRACE	ND	ND	ND	ND
MWS1/6	10-12	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	TRACE	ND	ND	ND	ND
MWS1/7	12-14	<5.0	ND	ND	ND	ND	TRACE	TRACE	ND	TRACE	ND	TRACE	ND	ND	ND	ND
MWS1/8	14-16	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	ND	ND	ND	ND	ND
MWS1/9	16-18	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	TRACE	ND	ND	ND	ND
MWS1/10	18-20	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	TRACE	ND	ND	ND	ND
MWS1/11	20-22	<5.0	ND	ND	ND	ND	TRACE	TRACE	ND	TRACE	TRACE	TRACE	ND	ND	ND	ND
MWS1/12	22-24	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	TRACE	ND	ND	ND	ND
MWS1/13	24-26	<5.0	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	TRACE	ND	ND	ND	ND
B3/1	0-2	<5.0	TRACE	ND	17.0	1.80	TRACE	TRACE	ND	TRACE	TRACE	TRACE	TRACE	ND	0.24	TRACE
B3/2	2-4	<5.0	TRACE	ND	TRACE	ND	TRACE	TRACE	ND	TRACE	TRACE	TRACE	0.12	ND	0.40	ND
B3/3	4-6	<5.0	ND	ND	TRACE	ND	TRACE	TRACE	ND	TRACE	ND	TRACE	ND	ND	TRACE	ND
B3/4	6-8	<5.0	ND	ND	ND	ND	TRACE	ND	ND	TRACE	ND	TRACE	ND	ND	TRACE	ND
B3/5	8-10	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	ND	TRACE	ND
B3/6	10-12	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	TRACE	ND	ND	ND	ND
B3/7	12-14	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	TRACE	TRACE	ND	ND	ND	ND
B3/8	14-16	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	ND	ND	ND
B3/9	16-18	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
B3/10	18-20	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	ND	ND	ND
B3/11	20-22	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
B3/12	22-24	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.078(B)	ND	ND	ND	ND

Boring #3 was located adjacent to monitoring well #1

Sample Identificat Number	Soil Depth	GC/MS MeCl	GC/MS DCE	GC/MS TRI	GC/MS TCE	GC/MS PCE	Headspace MeCl	Headspace DCE	Headspace TRI	Headspace TCE	Headspace PCE	TCLP MeCl	TCLP DCE	TCLP TRI	TCLP TCE	TCLP PCE
B11/1	0-2	<5.0	ND	ND	2.40	ND	ND	1.23	ND	8.40	TRACE	TRACE	ND	ND	ND	ND
B11/2	2-4	<5.0	ND	ND	1.70	ND	ND	TRACE	ND	TRACE	ND	0.18(B)	ND	ND	0.13	ND
B11/3	4-6	<5.0	ND	ND	ND	ND	ND	3.01	ND	1.50	ND	0.41(B)	ND	ND	0.02	ND
B11/4	6-8	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	ND	ND	ND
B11/5	8-10	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
B11/6	10-12	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
B11/7	12-14	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	0.28(B)	ND	ND	ND	ND
B11/8	14-16	<5.0	ND	ND	ND	ND	ND	3.07	ND	TRACE	ND	0.67(B)	ND	ND	ND	ND
B11/9	16-18	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
B11/10	18-20	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
B11/11	20-22	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.75(B)	ND	ND	ND	ND
B11/12	22-24	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND

Boring #11 was located adjacent to monitoring well #1

TABLE 3-1F. ANALYTICAL DATA FROM SOIL BORINGS: COMPARISON TABLE/MONITORING WELL #2 - PRETREATMENT, MID-TREATMENT, POST TREATMENT

Sample Identificat Number	Soil Depth	GC/MS Concentrations (mg/Kg) MeCl	DCE	TRI	TCE	PCE	Headspace Concentrations (mg/kg) MeCl	DCE	TRI	TCE	PCE	TCLP (mg/l) MeCl	DCE	TRI	TCE	PCE
MWS2/1	0-2	B	ND	ND	4.06	ND	ND	1.44	TRACE	7.78	ND	TRACE	ND	ND	ND	ND
MWS2/2	2-4	B	ND	ND	67.80	ND	ND	8.30	2.27	230.60	1.48	0.062(B)	ND	.ND	0.071	ND
MWS2/3	4-6	8.20	ND	ND	83.00	ND	ND	3.16	1.48	281.89	2.65	0.053(B)	ND	ND	0.238	ND
MWS2/4	6-8	B	ND	ND	7.07	ND	ND	2.29	2.68	406.62	1.89	0.056(B)	ND	ND	ND	ND
MWS2/5	8-10	<5.0	ND	ND	9.95	ND	ND	ND	ND	2.05	ND	0.055(B)	ND	ND	ND	ND
MWS2/6	10-12	B	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.093(B)	ND	ND	ND	ND
MWS2/7	12-14	B	ND	ND	ND	ND	ND	TRACE	ND	7.13	ND	0.167(B)	ND	ND	ND	ND
MWS2/8	14-16	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	0.051(B)	ND	ND	ND	ND
MWS2/9	16-18	<5.0	ND	ND	5.15	ND	ND	ND	ND	1.56	ND	TRACE	ND	ND	ND	ND
MWS2/10	18-20	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	ND	ND	ND
MWS2/11	20-22	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
MWS2/12	22-24	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	ND	ND	ND
B1/1	0-2	5.0(B)	ND	ND	280.0	TRACE	ND	TRACE	TRACE	49.01	TRACE	TRACE	0.072	TRACE	4.90	ND
B1/2	2-4	5.0(B)	TRACE	TRACE	58.0	TRACE	TRACE	TRACE	TRACE	26.34	TRACE	TRACE	ND	ND	2.00	ND
B1/3	4-6	<5.0	ND	TRACE	190.0	TRACE	TRACE	3.71	TRACE	313.09	TRACE	TRACE	0.072	ND	4.50	ND
B1/4	6-8	14	TRACE	TRACE	780.0	5.80	TRACE	TRACE	TRACE	274.07	TRACE	TRACE	TRACE	TRACE	6.60	TRACE
B1/5	8-10	14	ND	ND	TR-3.0	ND	TRACE	TRACE	ND	ND	ND	TRACE	ND	ND	TRACE	ND
B1/6	10-12	5.6(B)	ND	ND	3.0	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	TRACE	ND
B1/7	12-14	5.6(B)	ND	ND	TRACE	ND	ND	TRACE	ND	TRACE	ND	TRACE	ND	ND	0.10	ND
B1/8	14-16	5.8(B)	ND	ND	5.4	ND	ND	TRACE	TRACE	29.52	ND	TRACE	ND	ND	0.06	ND
B1/9	16-18	5.0(B)	ND	ND	ND	ND	ND	TRACE	TRACE	TRACE	ND	TRACE	ND	ND	TRACE	ND
B1/10	18-20	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	ND	TRACE	ND
B1/11	20-22	6.4(B)	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	ND	TRACE	ND
B1/12	22-24	<5.0	ND	ND	3.4	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	TRACE	ND

Boring #1 was located adjacent to monitoring well #2

Sample Identificat Number	Soil Depth	GC/MS Concentrations (mg/Kg) MeCl	DCE	TRI	TCE	PCE	Headspace Concentrations (mg/kg) MeCl	DCE	TRI	TCE	PCE	TCLP (mg/l) MeCl	DCE	TRI	TCE	PCE
B8/1	0-2	<5.0	ND	ND	TRACE	ND	ND	ND	ND	TRACE	ND	0.80(B)	ND	ND	ND	ND
B8/2	2-4	<5.0	2.20	ND	100	TRACE	ND	1.70	ND	29.00	ND	0.68(B)	TRACE	ND	ND	ND
B8/3	4-6	NR	-	-	-	-	NR	-	-	-	-	NR	-	-	-	-
B8/4	6-8	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.20(B)	ND	ND	ND	ND
B8/5	8-10	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.40(B)	ND	ND	ND	ND
B8/6	10-12	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TR-0.81(B)	ND	ND	ND	ND
B8/7	12-14	<5.0	ND	ND	7.70	ND	ND	ND	ND	TRACE	ND	0.10(B)	ND	ND	ND	ND
B8/8	14-16	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.07	ND	ND	ND	ND
B8/9	16-18	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	ND	ND	TRACE	ND
B8/10	18-20	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND	TRACE	ND
B8/11	20-22	11	ND	ND	ND	ND	ND	TRACE	ND	3.70	ND	TRACE	ND	ND	ND	ND
B8/12	22-24	5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND

Boring #8 was located adjacent to monitoring well #2

TABLE 3-1G. ANALYTICAL DATA FROM SOIL BORINGS: COMPARISON TABLE/MONITORING WELL #3 - PRETREATMENT, MID-TREATMENT, POST TREATMENT

Sample Identificat Number	Soil Depth	GC/MS Concentrations (mg/Kg)					Headspace Concentrations (mg/kg)					TCLP (mg/l)				
		MeCl	DCE	TRI	TCE	PCE	MeCl	DCE	TRI	TCE	PCE	MeCl	DCE	TRI	TCE	PCE
MWS3/1	0-2	B	ND	ND	10.30	ND	NR	-	-	-	-	TRACE	ND	ND	TRACE	ND
MWS3/2	2-4	<5.0	ND	ND	8.33	ND	ND	17.05	TRACE	56.77	TRACE	TRACE	ND	ND	TRACE	ND
MWS3/3	4-6	7.50	ND-3.93	ND	80.00	ND	ND	ND	ND	TRACE	ND	TRACE	ND	ND	0.136	ND
MWS3/4	6-8	B	ND	ND	160.00	9.85	ND	4.10	1.66	315.31	3.90	TRACE	ND	ND	0.067	ND
MWS3/5	8-10	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	1.66	TRACE	ND	ND	ND	ND
MWS3/6	10-12	NR	-	-	-	-	NR	-	-	-	-	NR	-	-	-	-
MWS3/7	12-14	<5.0	6.97	6.36	316.00	3.42	NR	-	-	-	-	TRACE	ND	TRACE	2.50	ND
MWS3/8	14-16	<5.0	2.11	3.48	195.00	ND	NR	-	-	-	-	TRACE	ND	0.077	4.00	TRACE
MWS3/9	16-18	<5.0	ND	3.86	218.00	3.12	NR	-	-	-	-	TRACE	0.053	0.11	5.00	TRACE
MWS3/10	18-20	<5.0	20.40	36.80	1570.00	ND	NR	-	-	-	-	TRACE	ND	ND	0.059	ND
MWS3/11	20-22	<5.0	ND	ND	106.00	ND	NR	-	-	-	-	TRACE	ND	ND	0.089	ND
MWS3/12	22-24	<5.0	ND	ND	64.10	ND	NR	-	-	-	-	TRACE	ND	ND	ND	ND
B2/1	0-2	<5.0	4.2	ND	2.4	ND	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	TRACE	ND	TRACE	ND
B2/2	2-4	<5.0	16.0	ND	32.0	1.90	TRACE	25.32	TRACE	13.98	TRACE	TRACE	0.49	ND	0.73	TRACE
B2/3	4-6	<5.0	5.0	ND	66.0	3.40	ND	ND	ND	TRACE	ND	TRACE	0.44	TRACE	4.70	0.064
B2/4	6-8	<5.0	TRACE	ND	4.0	ND	TRACE	2.23	ND	TRACE	TRACE	TRACE	0.13	ND	0.30	TRACE
B2/5	8-10	<5.0	ND	ND	ND	ND	TRACE	TRACE	ND	TRACE	TRACE	TRACE	ND	ND	TRACE	ND
B2/6	10-12	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	TRACE	ND
B2/7	12-14	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	TRACE	ND	ND	TRACE	ND
B2/8	14-16	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	TRACE	TRACE	ND	ND	ND	ND
B2/9	16-18	<5.0	ND	ND	ND	ND	ND	TRACE	TRACE	TRACE	TRACE	TRACE	ND	ND	TRACE	ND
B2/10	18-20	<5.0	ND	ND	TRACE	ND	ND	TRACE	TRACE	14.65	TRACE	TRACE	ND	ND	TRACE	ND
B2/11	20-22	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	ND	ND	ND
B2/12	22-24	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND

Boring #2 was located adjacent to monitoring well #3

Sample Identificat Number	Soil Depth	GC/MS MeCl	GC/MS DCE	GC/MS TRI	GC/MS TCE	GC/MS PCE	Headspace MeCl	Headspace DCE	Headspace TRI	Headspace TCE	Headspace PCE	TCLP MeCl	TCLP DCE	TCLP TRI	TCLP TCE	TCLP PCE
B13/1	0-2	<25.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND	ND	ND
B13/2	2-4	<25.0	59.00	ND	800.00	ND	ND	22.0	ND	300.0	ND	TR-0.27	0.09	ND	5.8	ND
B13/3	4-6	<25.0	ND	ND	84.00	ND	ND	1.6	ND	18.0	ND	TRACE	0.46	ND	0.37	ND
B13/4	6-8	<5.0	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	TRACE	ND	ND	0.06	ND
B13/5	8-10	<5.0	ND	ND	63.00	4.30	ND	TRACE	ND	ND	ND	0.06(B)	ND	ND	ND	ND
B13/6	10-12	<5.0	ND	ND	2.30	ND	ND	TRACE	ND	27.0	ND	0.06(B)	ND	ND	ND	ND
B13/7	12-14	<5.0	ND	ND	ND	ND	ND	2.5	ND	17.0	ND	TRACE	ND	ND	ND	ND
B13/8	14-16	<5.0	ND	ND	ND	ND	ND	1.1	ND	6.8	ND	TRACE	ND	ND	ND	ND
B13/9	16-18	<5.0	ND	ND	62	ND	ND	TRACE	TRACE	91.0	ND	ND	ND	ND	ND	ND
B13/10	18-20	<5.0	ND	ND	2.4	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
B13/11	20-22	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.48(B)	ND	ND	ND	ND
B13/12	22-24	<5.0	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND	ND	ND	ND	ND

Boring #13 was located adjacent to monitoring well #3

TABLE 3-III. ANALYTICAL DATA FROM SOIL BORINGS: COMPARISON TABLE/MONITORING WELL #4 - PRETREATMENT, MID-TREATMENT, POST TREATMENT

Sample Identificat Number	Soil Depth	GC/MS Concentrations (mg/Kg)					Headspace Concentrations (mg/kg)					TCLP (mg/l)				
		MeCl	DCE	TRI	TCE	PCE	MeCl	DCE	TRI	TCE	PCE	MeCl	DCE	TRI	TCE	PCE
MWS4/1	0-2	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
MWS4/2	2-4	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
MWS4/3	4-6	<5.0	ND	ND	2.21	ND	ND	2.39	ND	40.68	1.49	TRACE	ND	ND	ND	ND
MWS4/4	6-8	<5.0	ND	ND	3.25	ND	ND	7.46	TRACE	131.88	3.95	TRACE	ND	ND	TRACE	ND
MWS4/5	8-10	<5.0	ND-6.8	ND	ND	ND	ND	ND-6.8	ND	7.38	3.29	TRACE	ND	ND	TRACE	ND
MWS4/6	10-12	<5.0	ND	ND	ND-4.24	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	TRACE	ND
MWS4/7	12-14	<5.0	ND	ND	ND	ND	ND	TRACE	TRACE	15.18	3.33	TRACE	ND	ND	ND	ND
MWS4/8	14-16	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	ND	ND	ND
MWS4/9	16-18	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	ND	ND	ND
MWS4/10	18-20	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
MWS4/11	20-22	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
MWS4/12	22-24	TRACE	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	ND	ND	ND
B4/1	0-2	<5.0	ND	ND	ND	ND	TRACE	ND	ND	TRACE	TRACE	0.073(B)	ND	ND	TRACE	ND
B4/2	2-4	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	0.062(B)	ND	ND	ND	ND
B4/3	4-6	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	ND	TRACE	ND
B4/4	6-8	<5.0	ND	ND	ND	ND	TRACE	ND	ND	TRACE	TRACE	TRACE	ND	ND	ND	ND
B4/5	8-10	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
B4/6	10-12	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	TRACE	ND	ND	ND	ND
B4/7	12-14	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	TRACE	ND	ND	ND	ND
B4/8	14-16	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
B4/9	16-18	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
B4/10	18-20	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
B4/11	20-22	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
B4/12	22-24	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND

Boring #4 was located adjacent to monitoring well #4

Sample Identificat Number	Soil Depth	GC/MS Concentrations (mg/Kg)					Headspace Concentrations (mg/kg)					TCLP (mg/l)				
		MeCl	DCE	TRI	TCE	PCE	MeCl	DCE	TRI	TCE	PCE	MeCl	DCE	TRI	TCE	PCE
B10/1	0-2	<5.0	ND	ND	2.3	ND	ND	TRACE	ND	TRACE	ND	0.72(B)	ND	ND	ND	ND
B10/2	2-4	<5.0	ND	ND	7.5	ND	ND	2.90	ND	11.70	TRACE	0.092	ND	ND	0.35	ND
B10/3	4-6	<5.0	ND	ND	4.5	ND	ND	ND	ND	ND	ND	0.52(B)	ND	ND	TRACE	ND
B10/4	6-8	<5.0	ND	ND	1.3	ND	ND	ND	ND	TRACE	ND	TR-0.60(B)	ND	ND	ND	ND
B10/5	8-10	<5.0	ND	ND	TRACE	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
B10/6	10-12	<5.0	ND	ND	1.60	TRACE	ND	ND	ND	TR-5.04	ND	TR-0.14(B)	ND	ND	ND	ND
B10/7	12-14	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND	0.07	ND	ND	ND	ND
B10/8	14-16	<5.0	ND	ND	4.30	ND	ND	TRACE	ND	TRACE	ND	TRACE	ND	ND	TRACE	ND
B10/9	16-18	<5.0	ND	ND	3.70	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
B10/10	18-20	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	TRACE	ND	ND	ND	ND
B10/11	20-22	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.70(B)	ND	ND	ND	ND
B10/12	22-24	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.41(B)	ND	ND	ND	ND

Boring #10 was located adjacent to monitoring well #4

SOIL BORING: TCE VERSUS DEPTH

Figures 3-1a through 3-1f are representative of the changes in TCE concentration and location of contamination in the borehole over time. These graphs were generated by plotting TCE results obtained over the course of the soil boring programs. Each applicable phase for each location is presented on one figure. For example, TCE concentrations for vacuum monitoring Well No. 3 were plotted on one graph for Pre, Mid, and Post Treatment so that a phase to phase comparison can be made.

WELL HEAD AND PROCESS GAS CONCENTRATIONS

Gas Samples collected from extraction and vacuum monitoring well heads during the course of this program were analyzed on a GC/FID and a GC/ECD in the onsite mobile laboratory. In all cases, TCE concentrations were much higher than any of the other compounds looked for during the study. TCE was, therefore, used as the dominant indicator parameter and graphs of TCE concentration for all extraction and monitoring wells are presented in Figures 3.2a through 3.2p. Additionally, two other compounds 1,1,1-trichloroethane (TR1) and tetrachloroethylene (PERC), were routinely found in Extraction Well No. 1. Therefore, TRI and PERC concentrations were graphed for extraction Well No. 1, deep and shallow, and are presented in Figures 3-2q through 3-2t.

All of the graphs presented in this section were prepared on a semi-log scale with the x coordinate representing the day of active treatment (1-60) and the y coordinate designated as the concentration of the compound in parts per million (ppmv). Fit line equations in the form of $y - a\ e^{bx}$ and curve coefficients (measure of accuracy of "fit") are included on each graph. The results of all well head and process gas samples can be found in Appendix E.

SHALLOW SOIL GAS PLOTS

During the Pre, Mid, and Post Treatment phases, shallow soil gas samples were collected from 12 hollow stainless steel tubes that were hand driven at

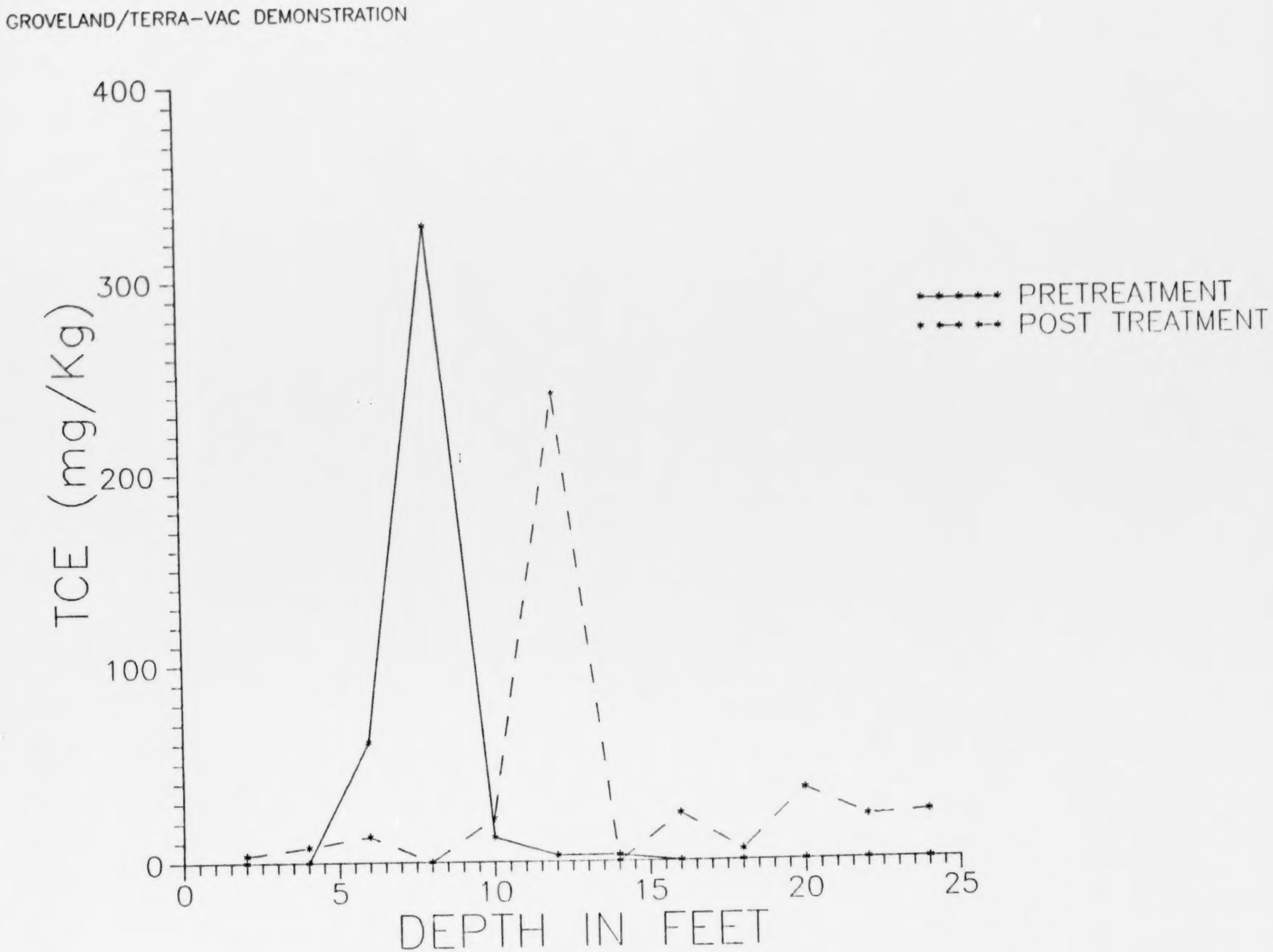


Figure 3.1A. Extraction Well #1 results from soil boring program.

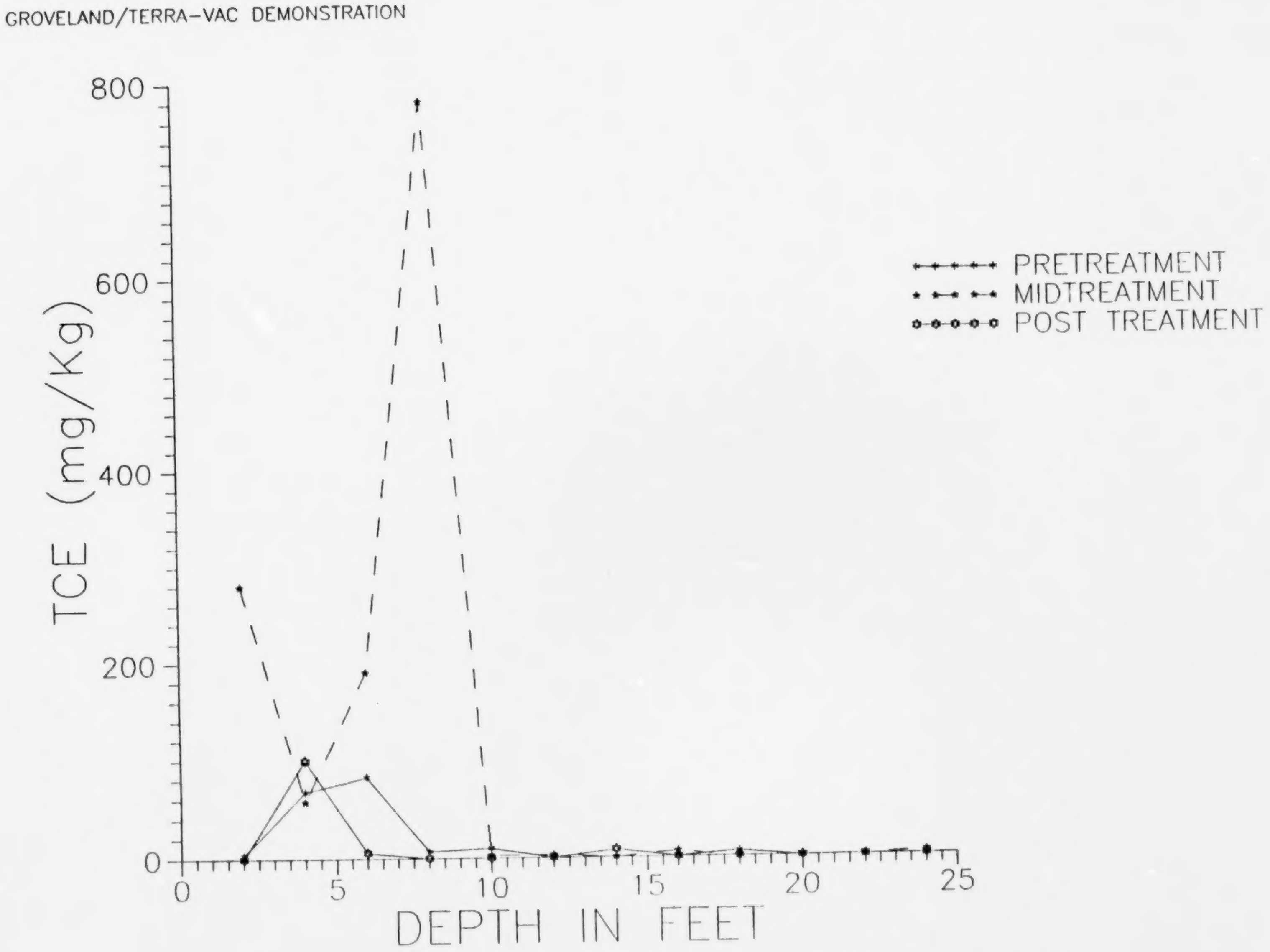


Figure 3.1B. Vacuum Monitoring Well #2 results from soil boring program.

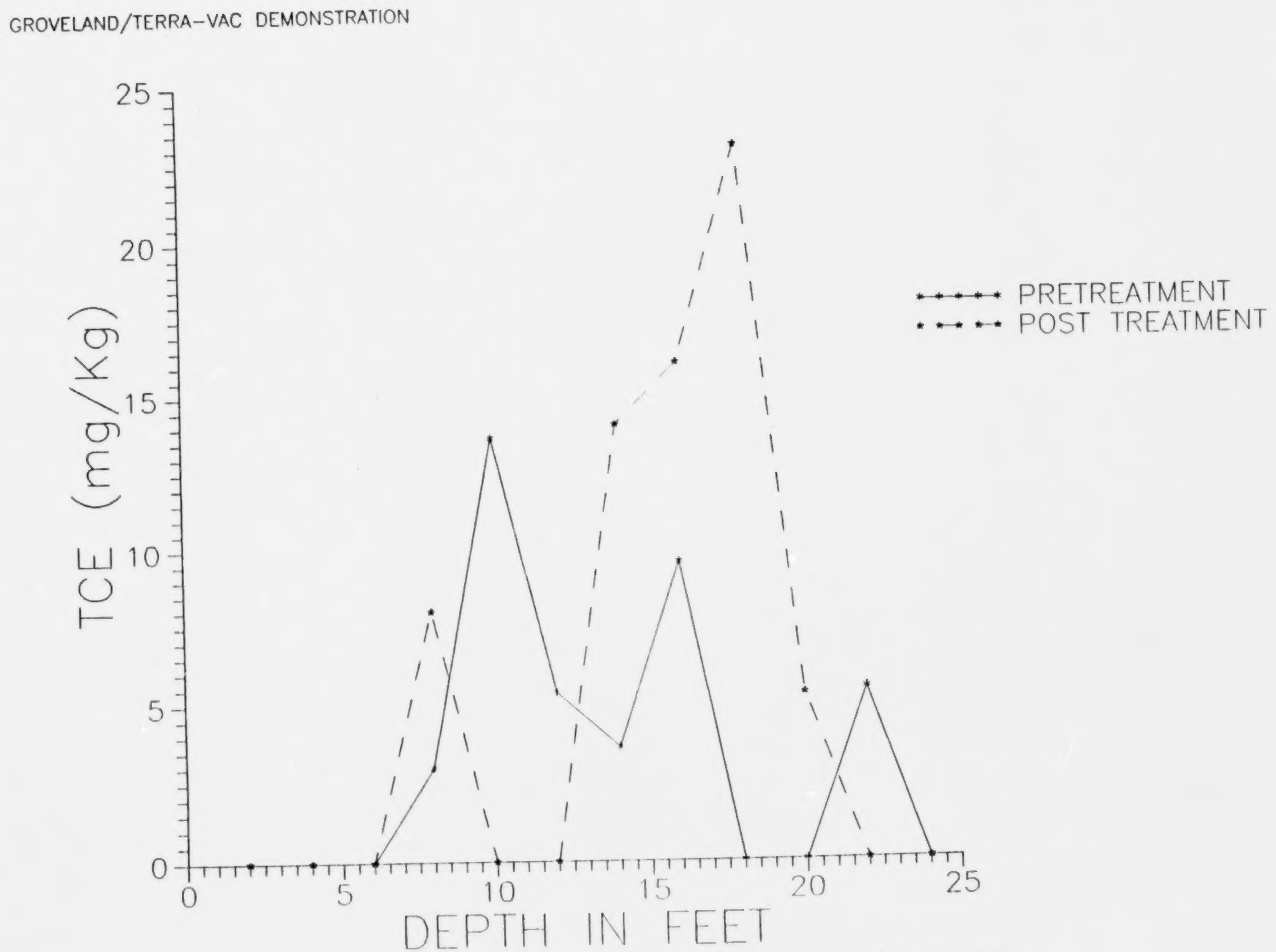


Figure 3.1C. Extraction Well #2 results from soil boring program.

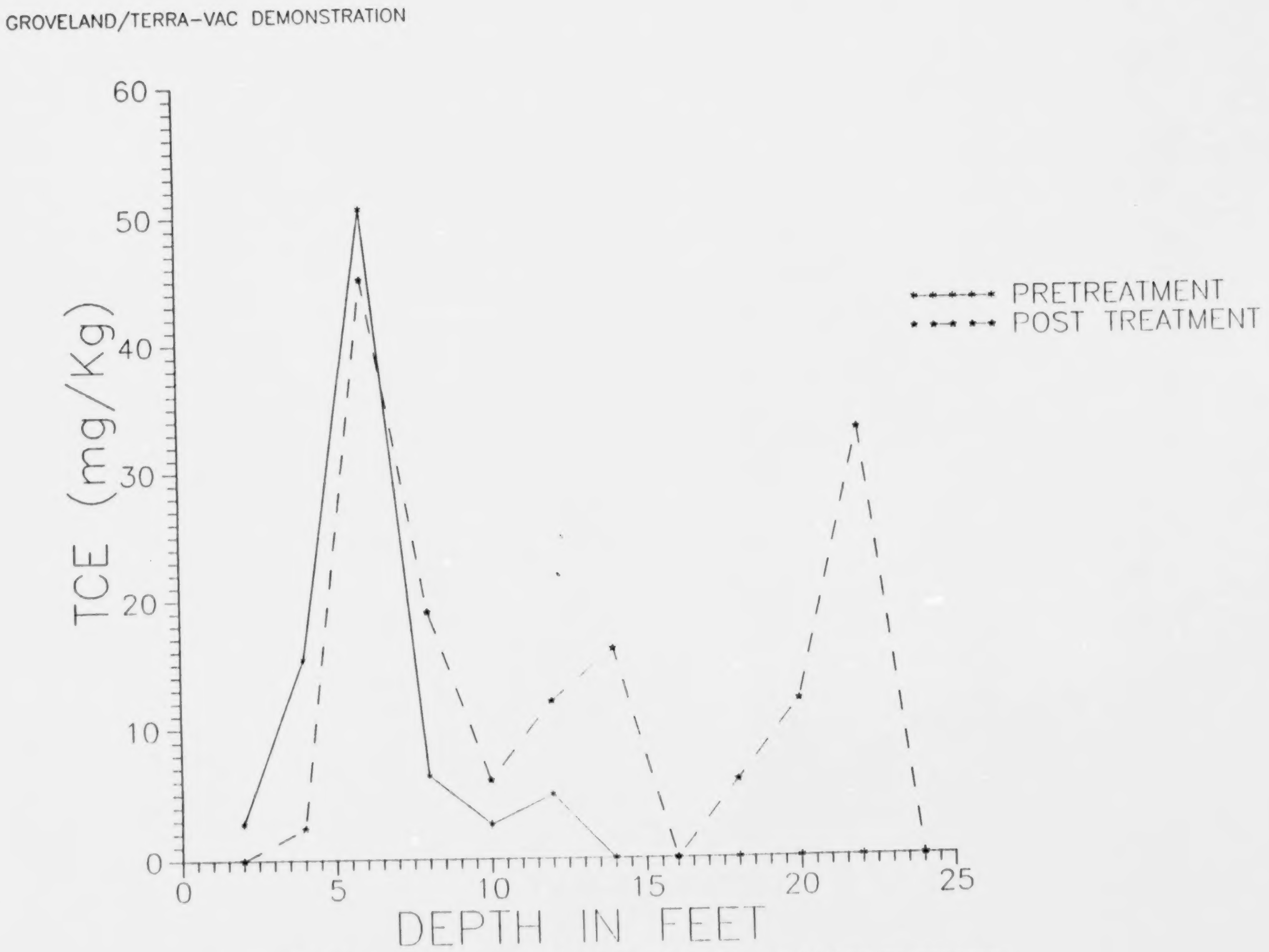


Figure 3.1D. Extraction Well #3 results from soil boring program.

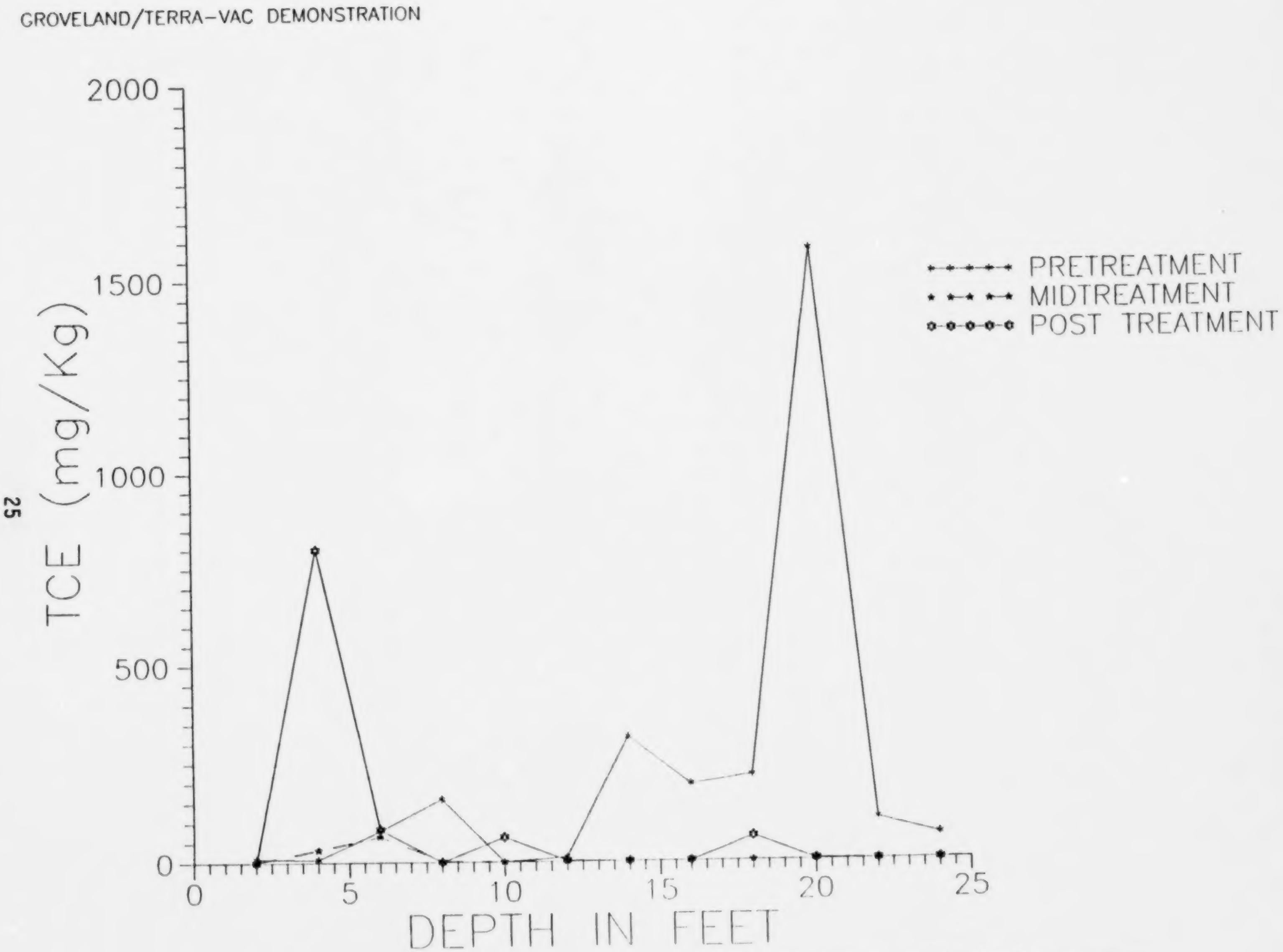


Figure 3.1E. Vacuum Monitoring Well #3 results from soil boring program.

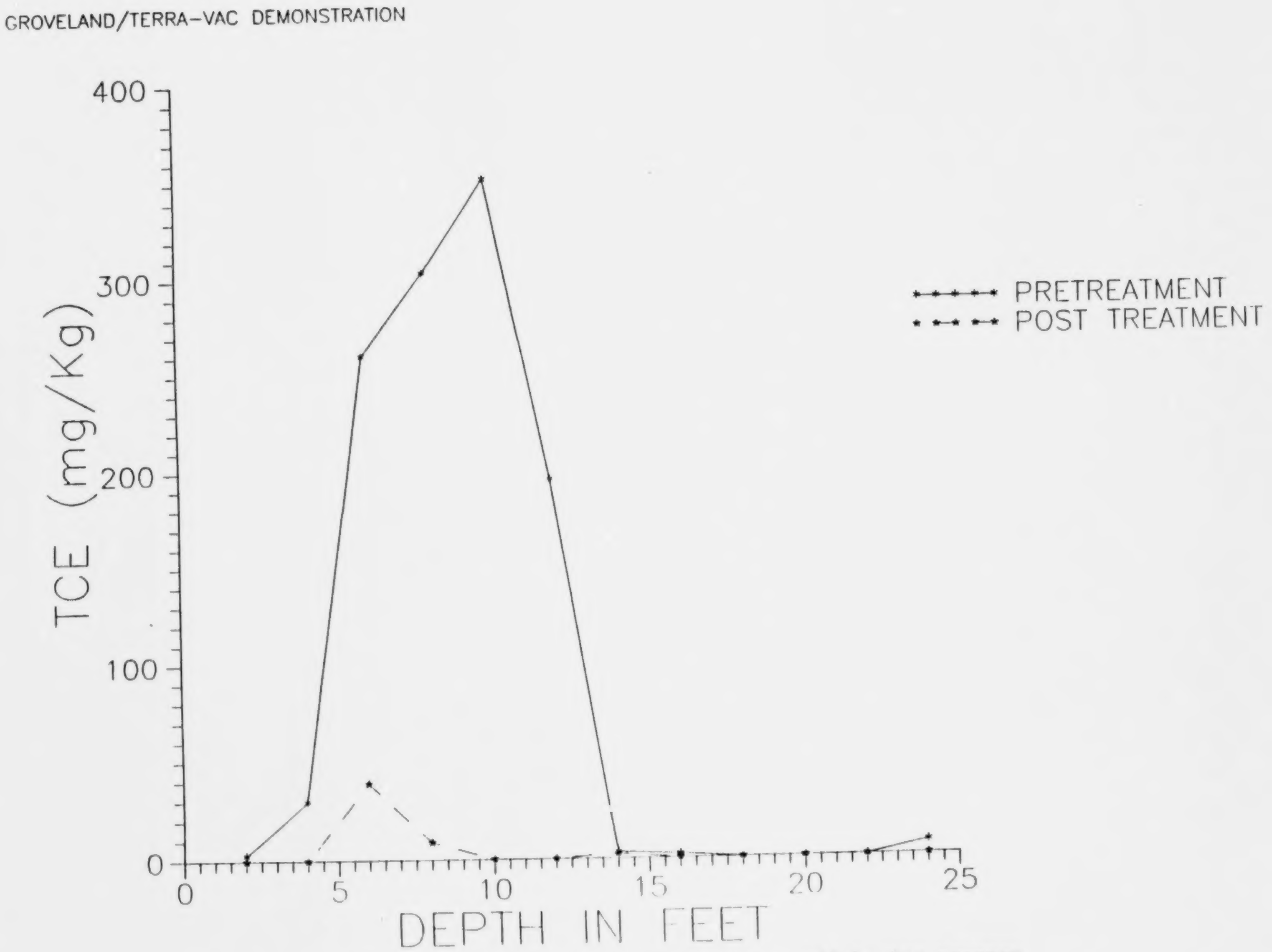


Figure 3.1F. Extraction Well #4 results from soil boring program.

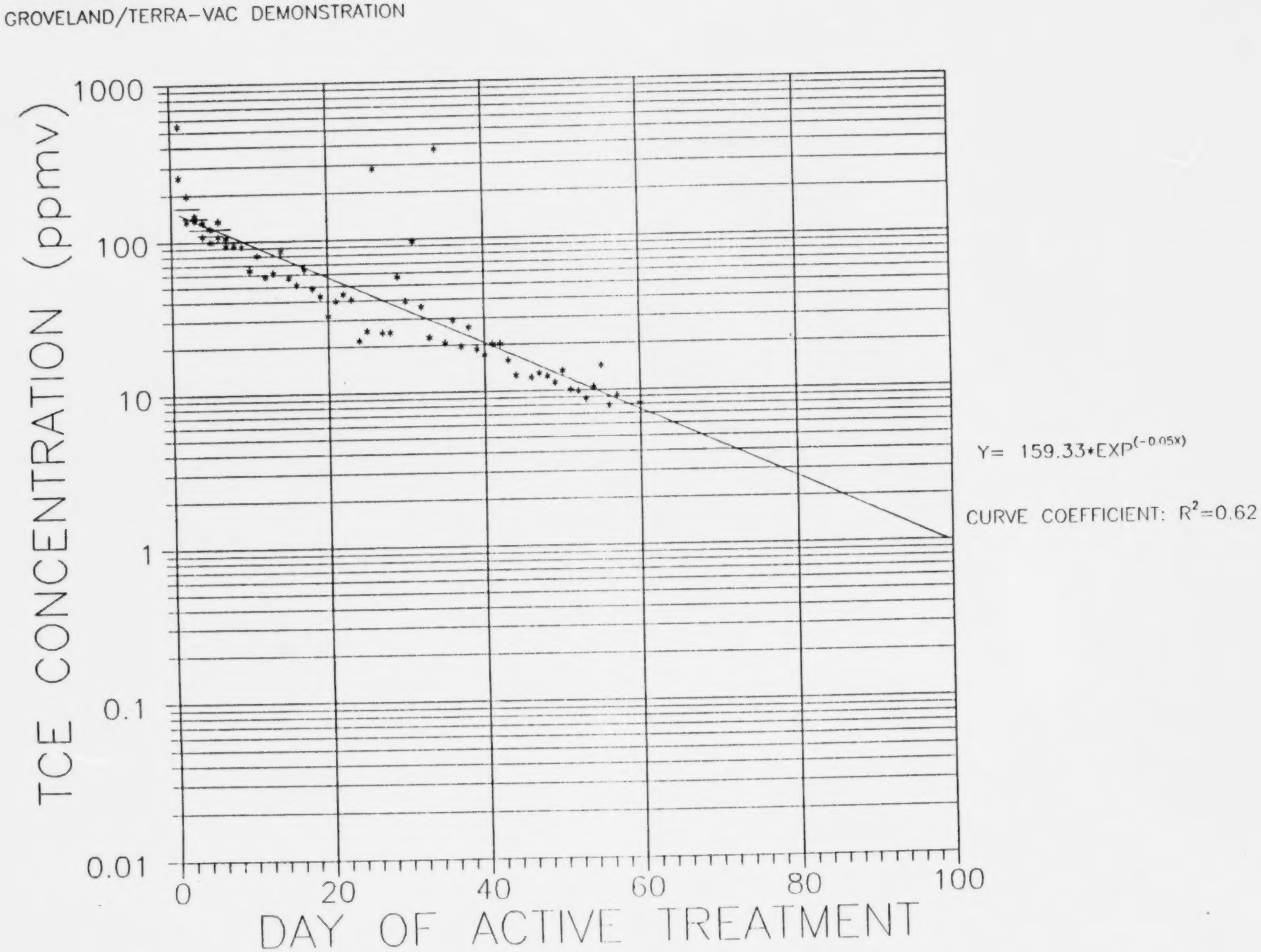


Figure 3-2A. Extraction Well #1 shallow.

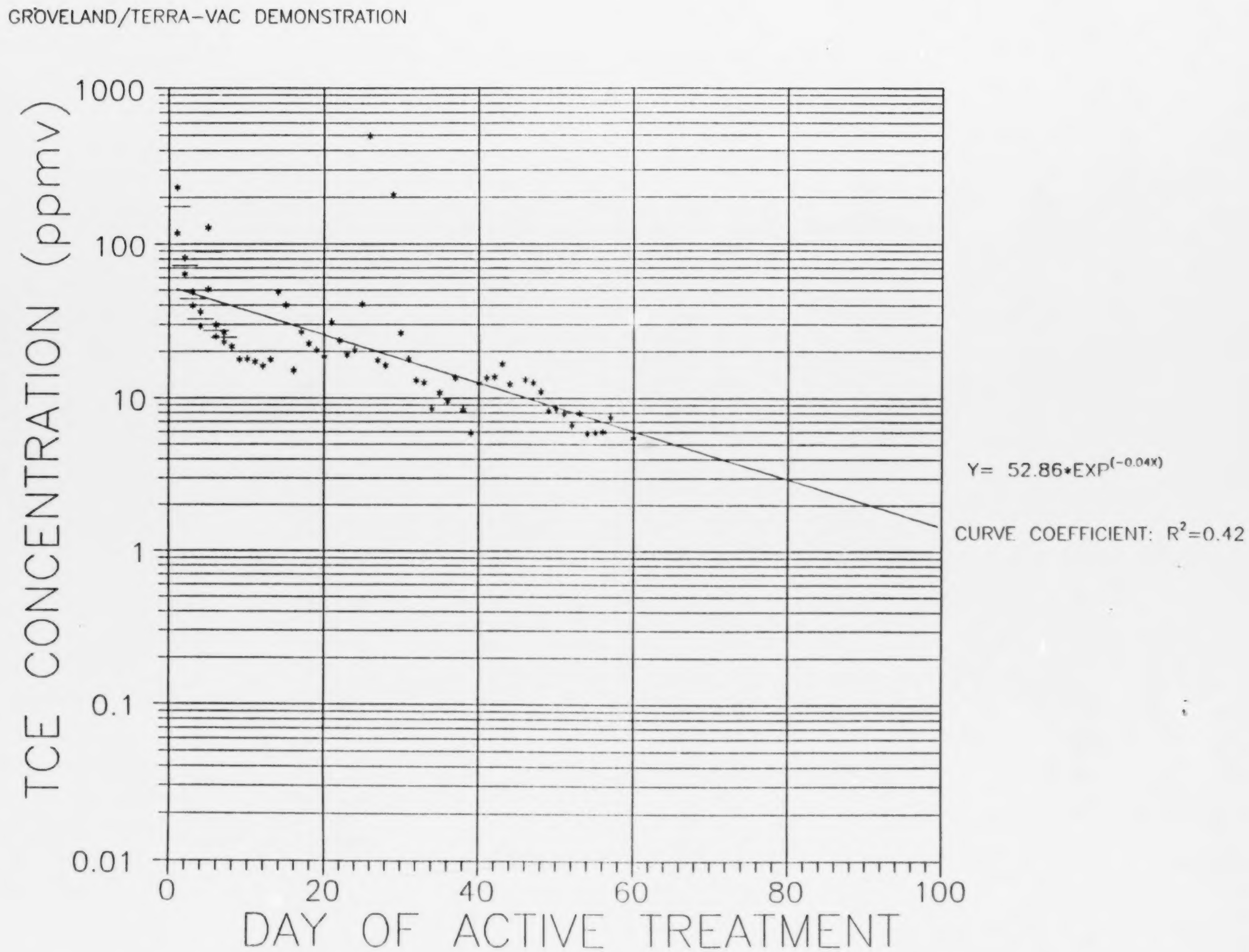


Figure 3-2B. Extraction Well #1 deep.

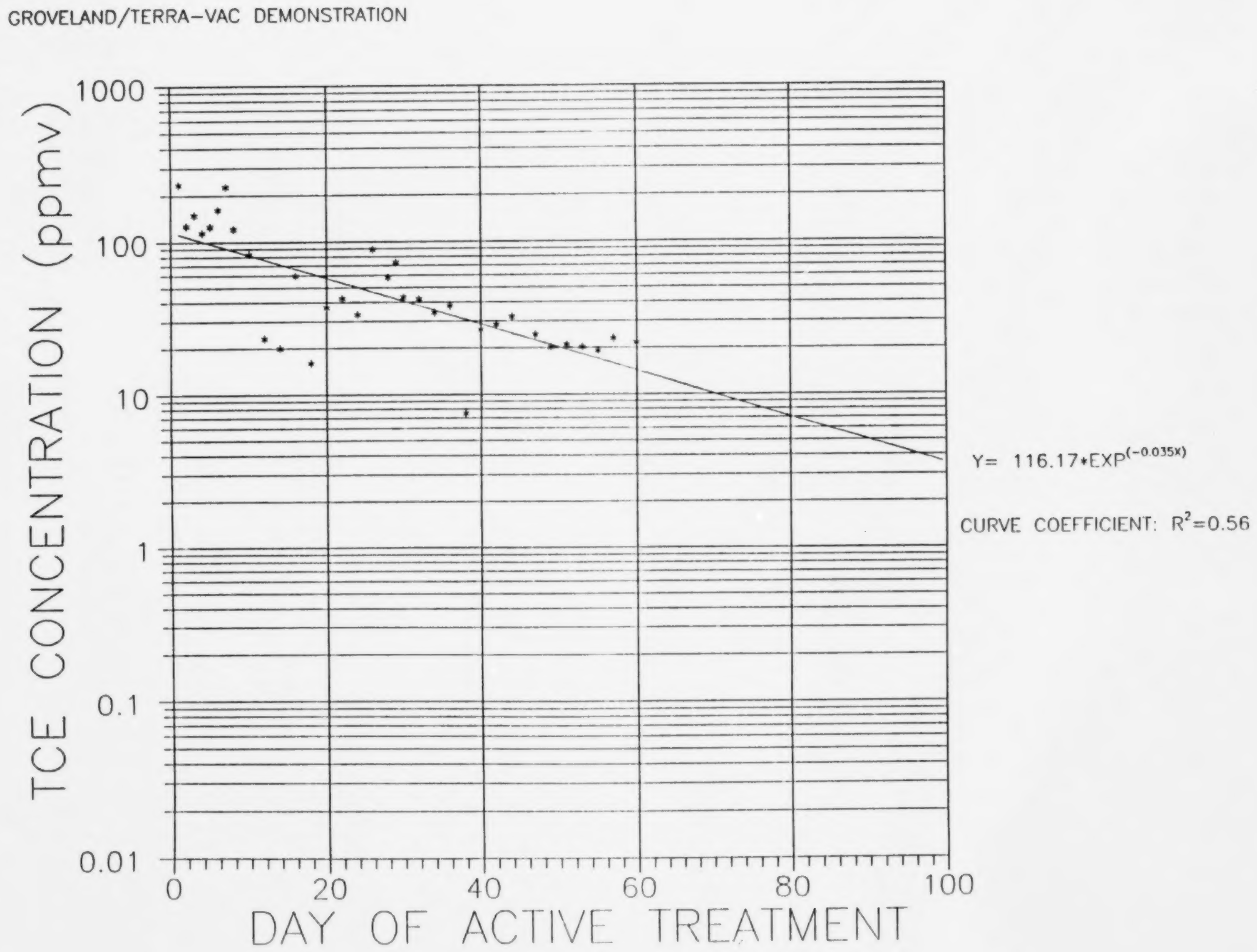


Figure 3-2C. Extraction Well #2 shallow.

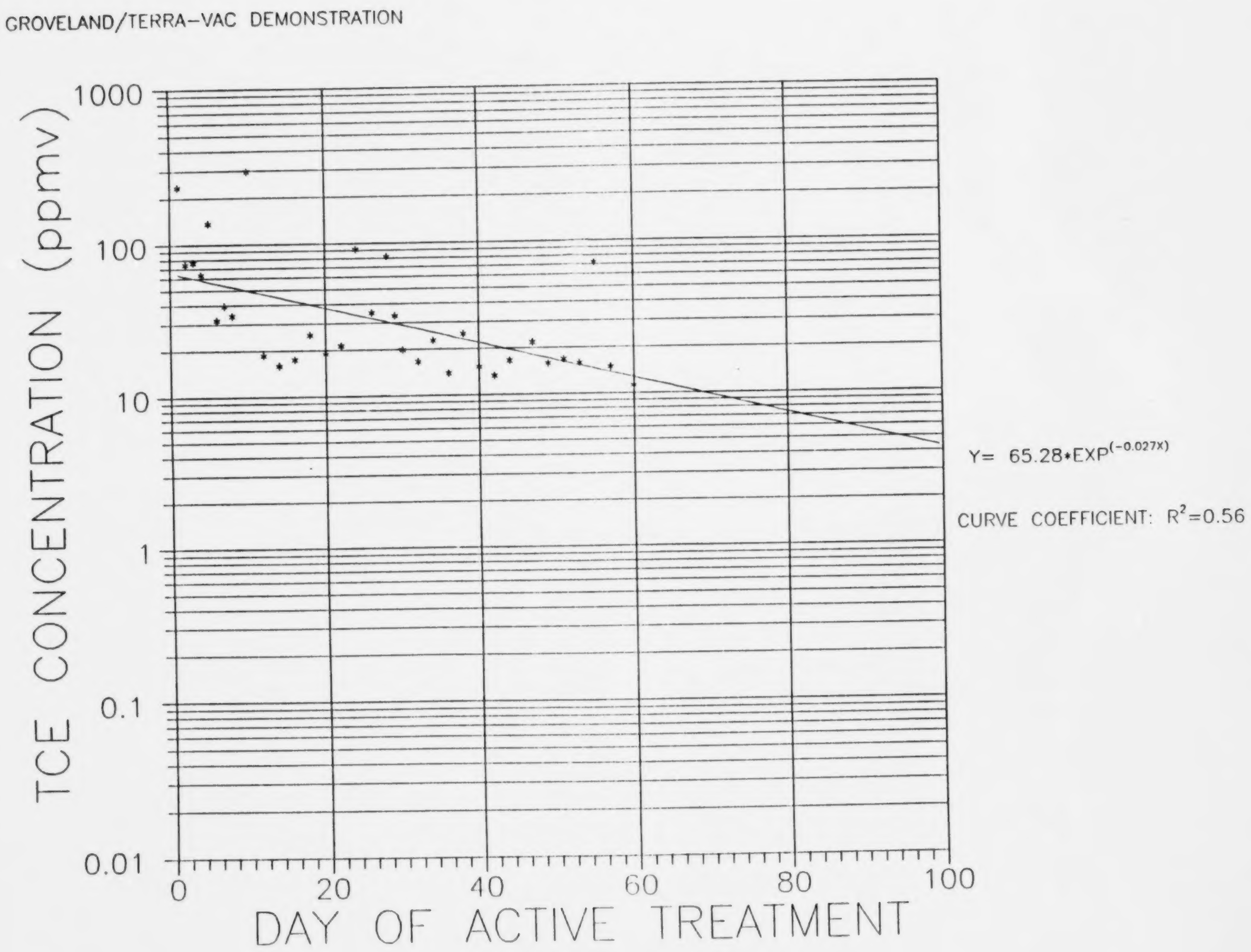


Figure 3-2D. Extraction Well #2 deep.

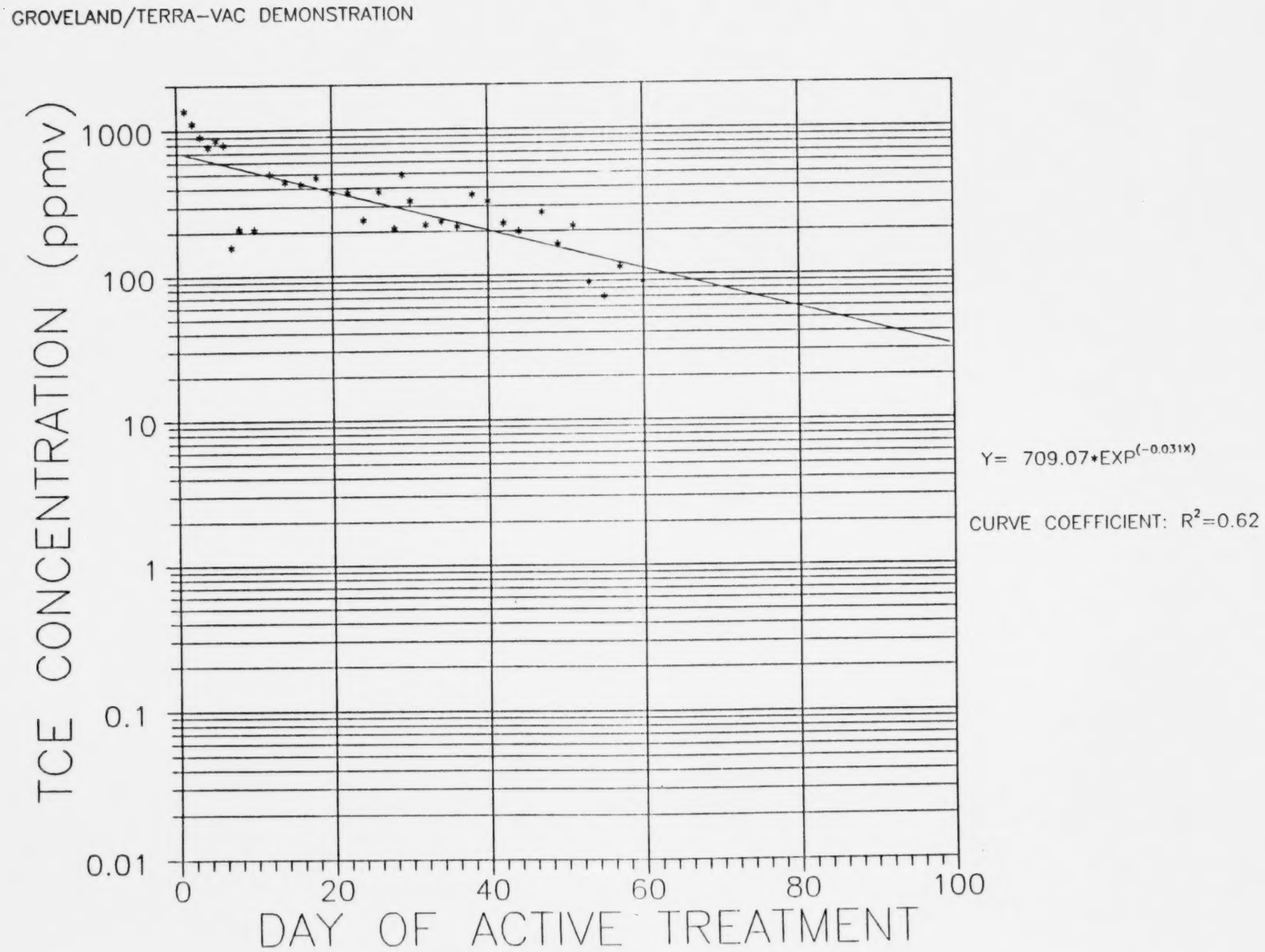


Figure 3-2E. Extraction Well #3 shallow.

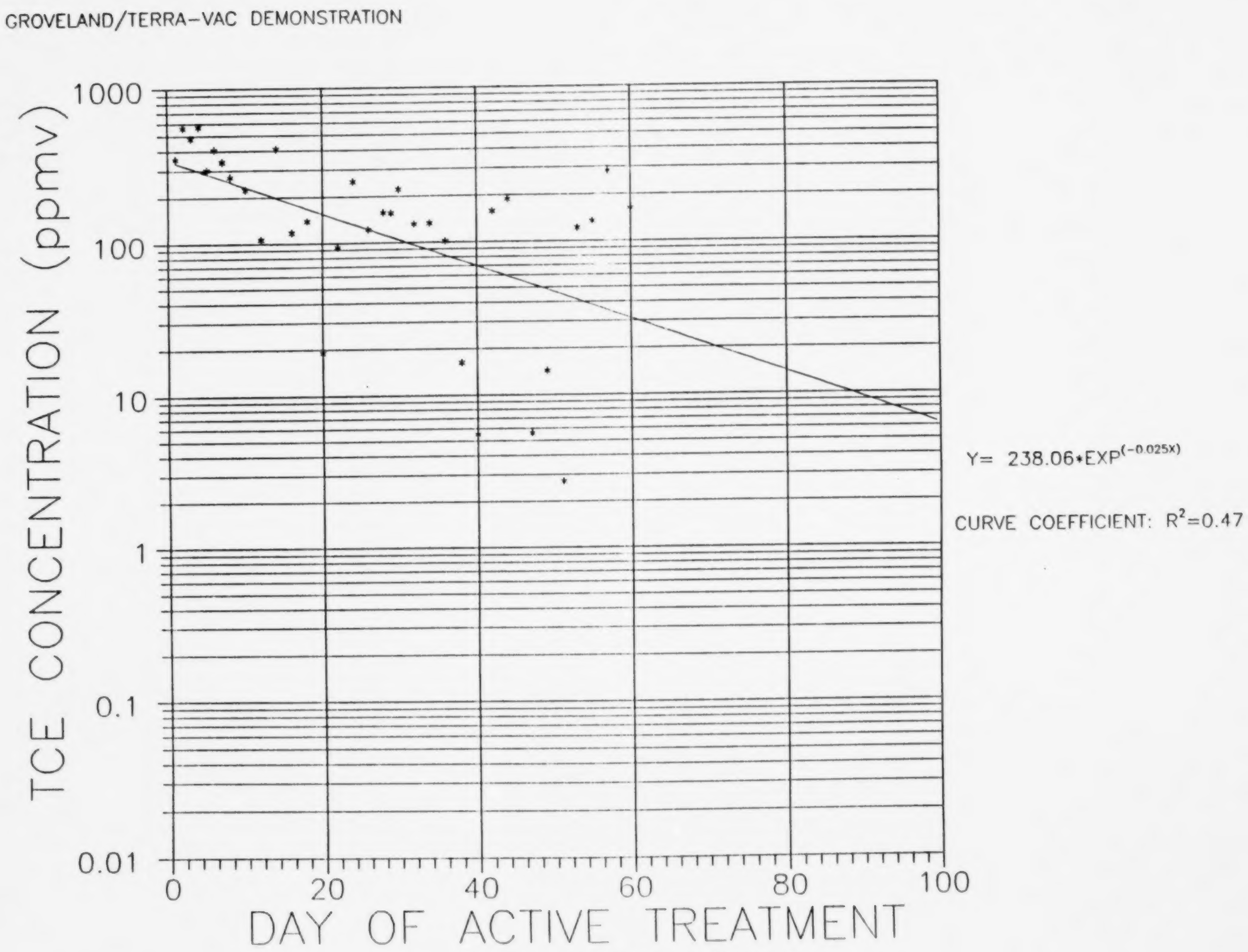


Figure 3-2F. Extraction Well #3 deep.

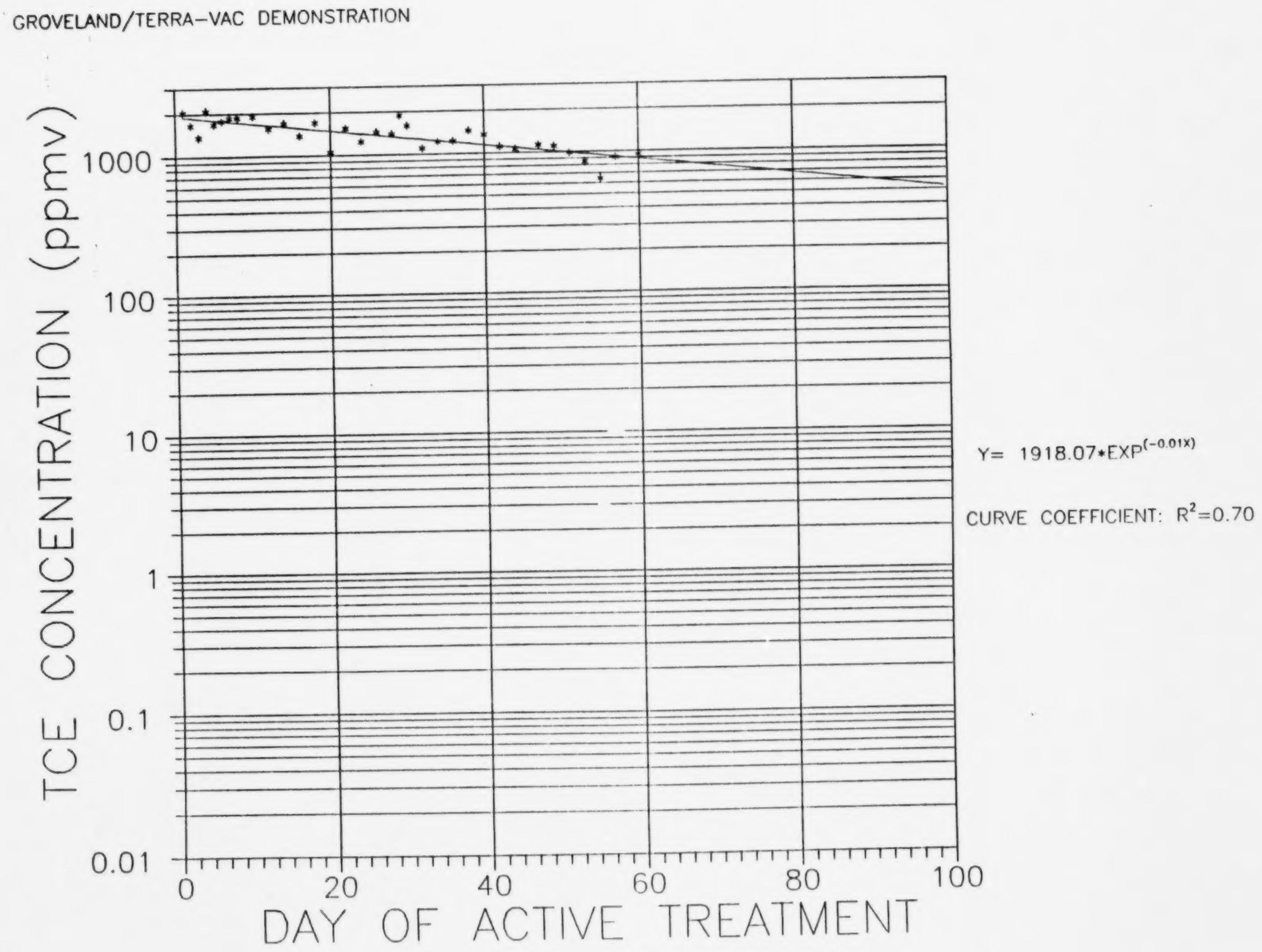


Figure 3-2G. Extraction Well #4 shallow.

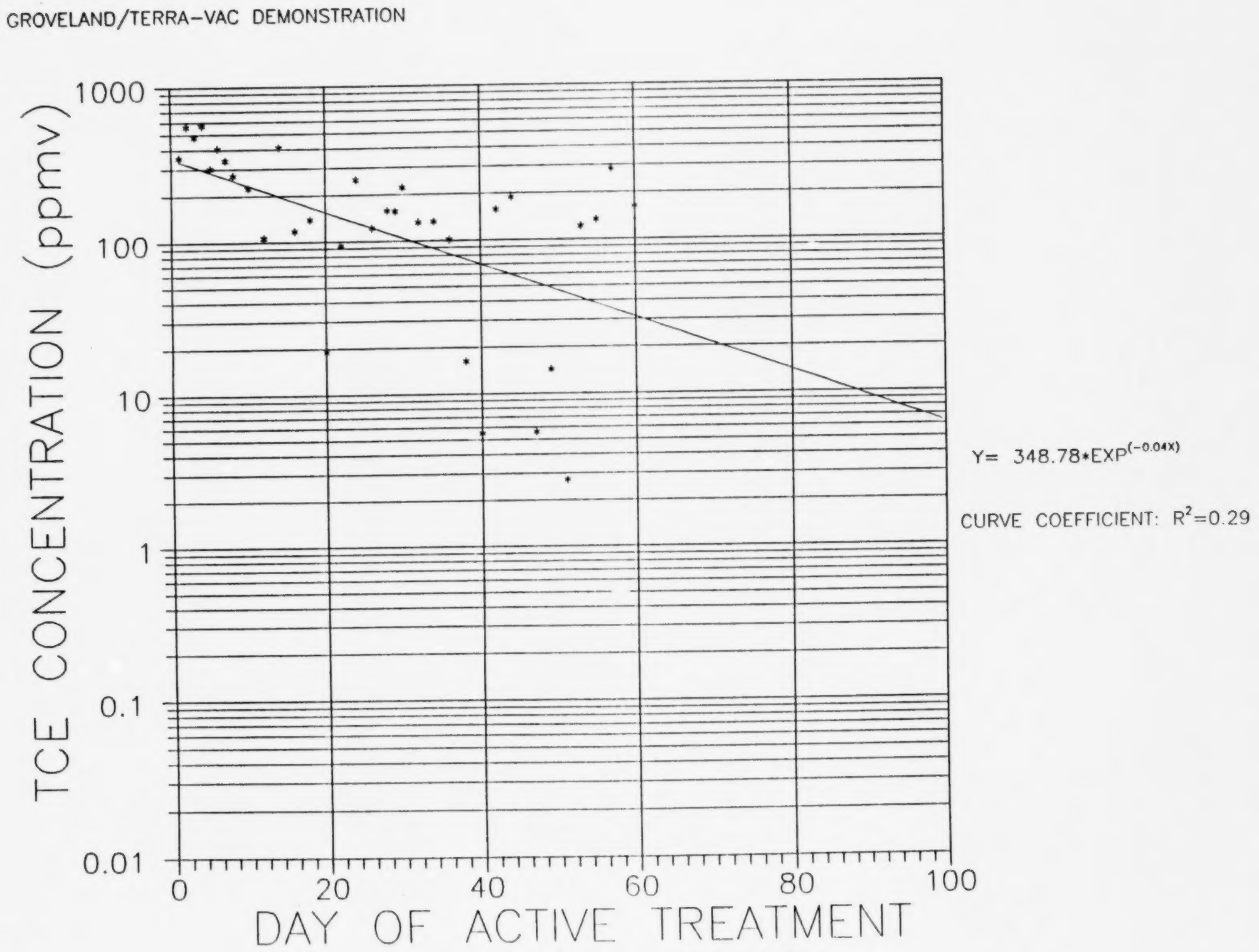


Figure 3-2H. Extraction Well #4 deep.

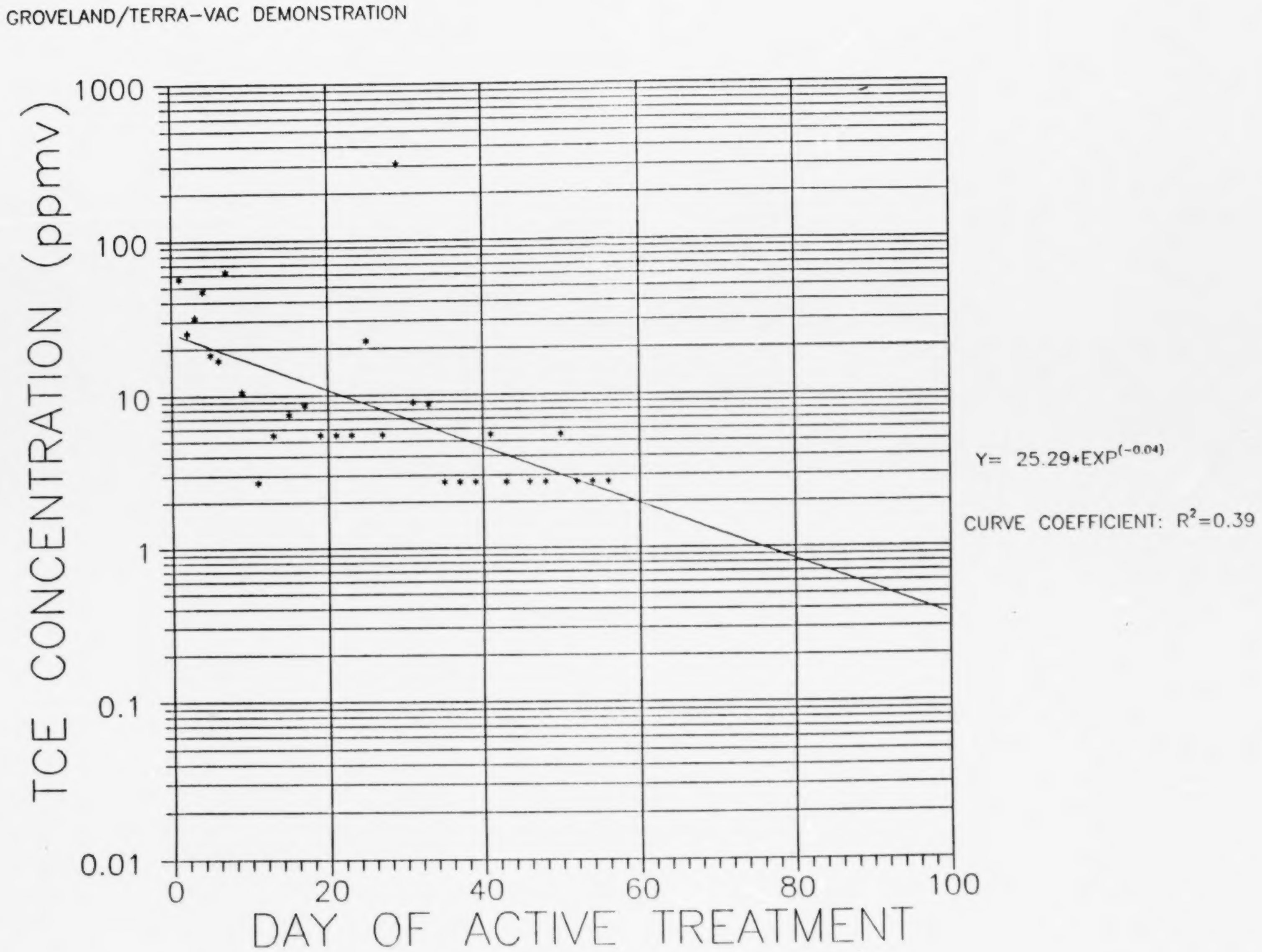


Figure 3-21. Vacuum Monitoring Well #1 shallow.

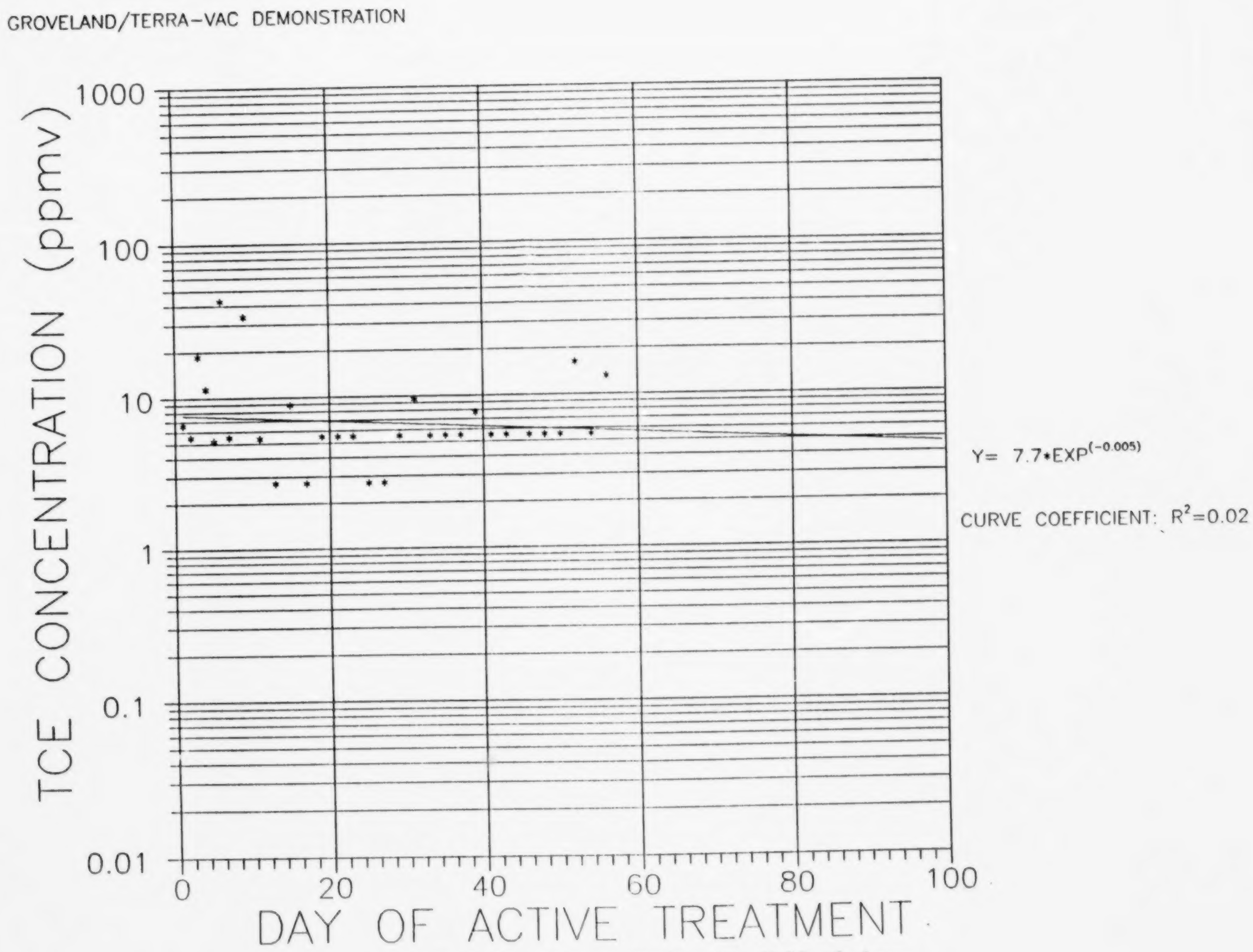


Figure 3-2J. Vacuum Monitoring Well #1 deep.

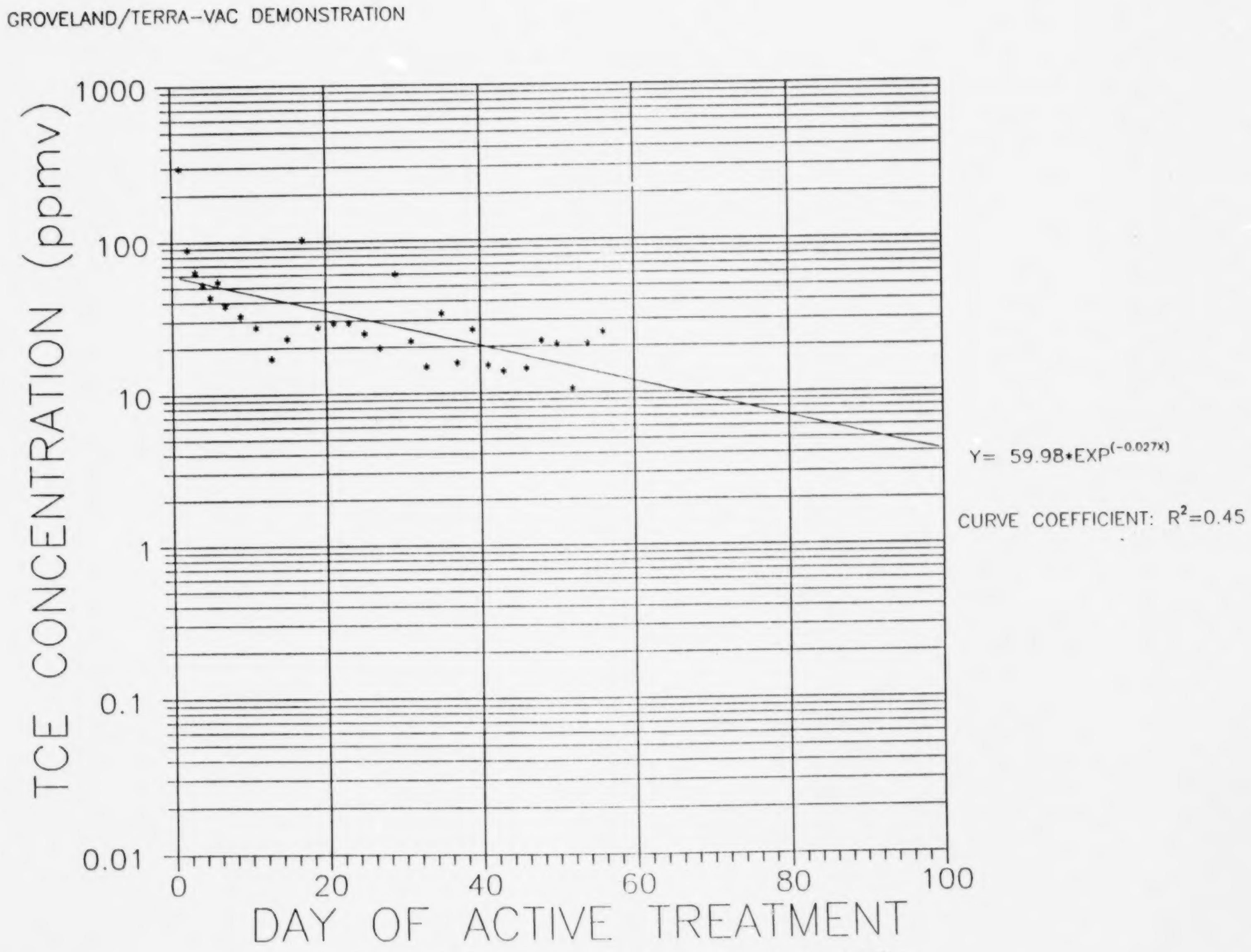


Figure 3-2K. Vacuum Monitoring Well #2 shallow.

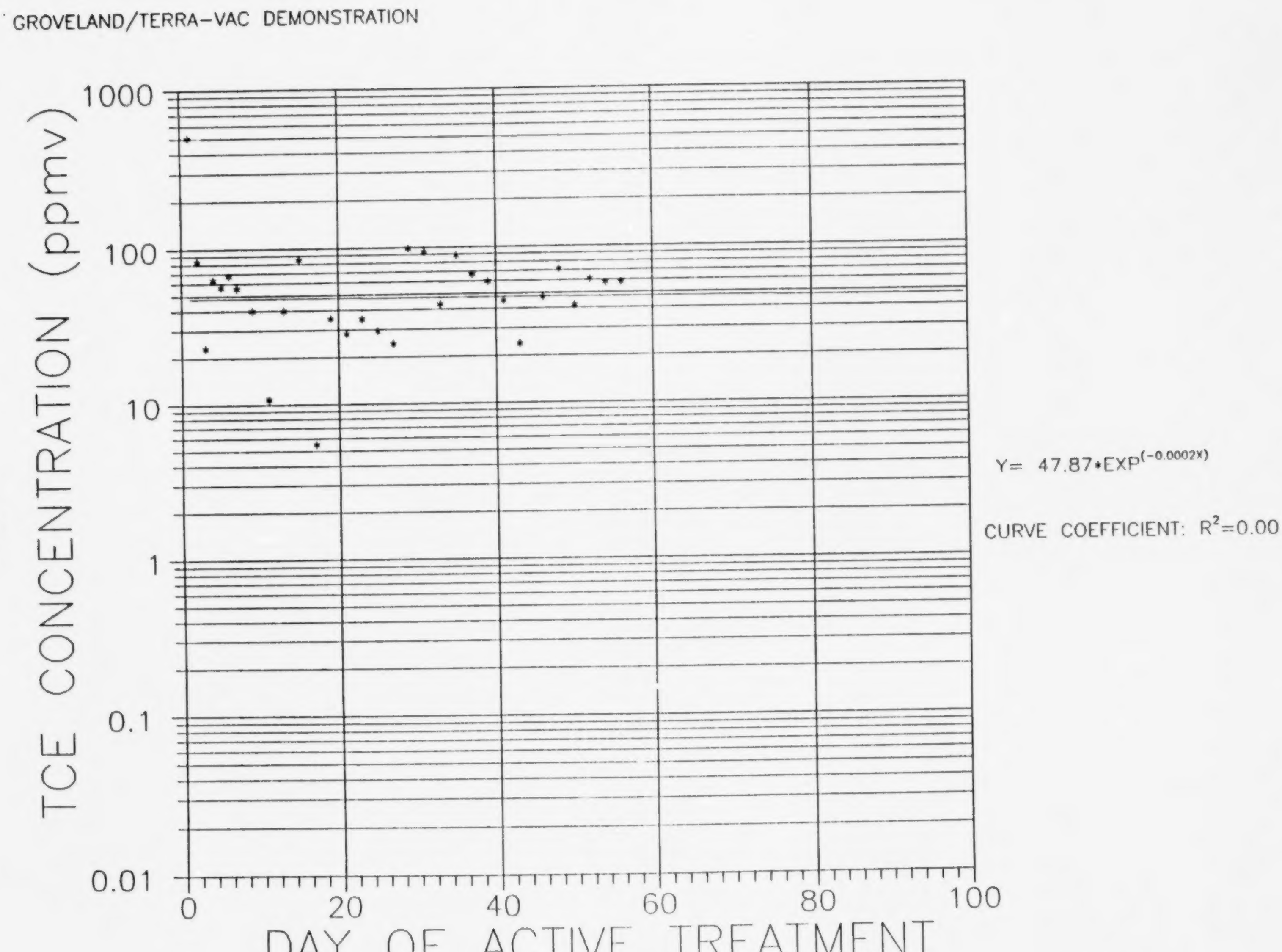


Figure 3-2L. Vacuum Monitoring Well #2 deep.

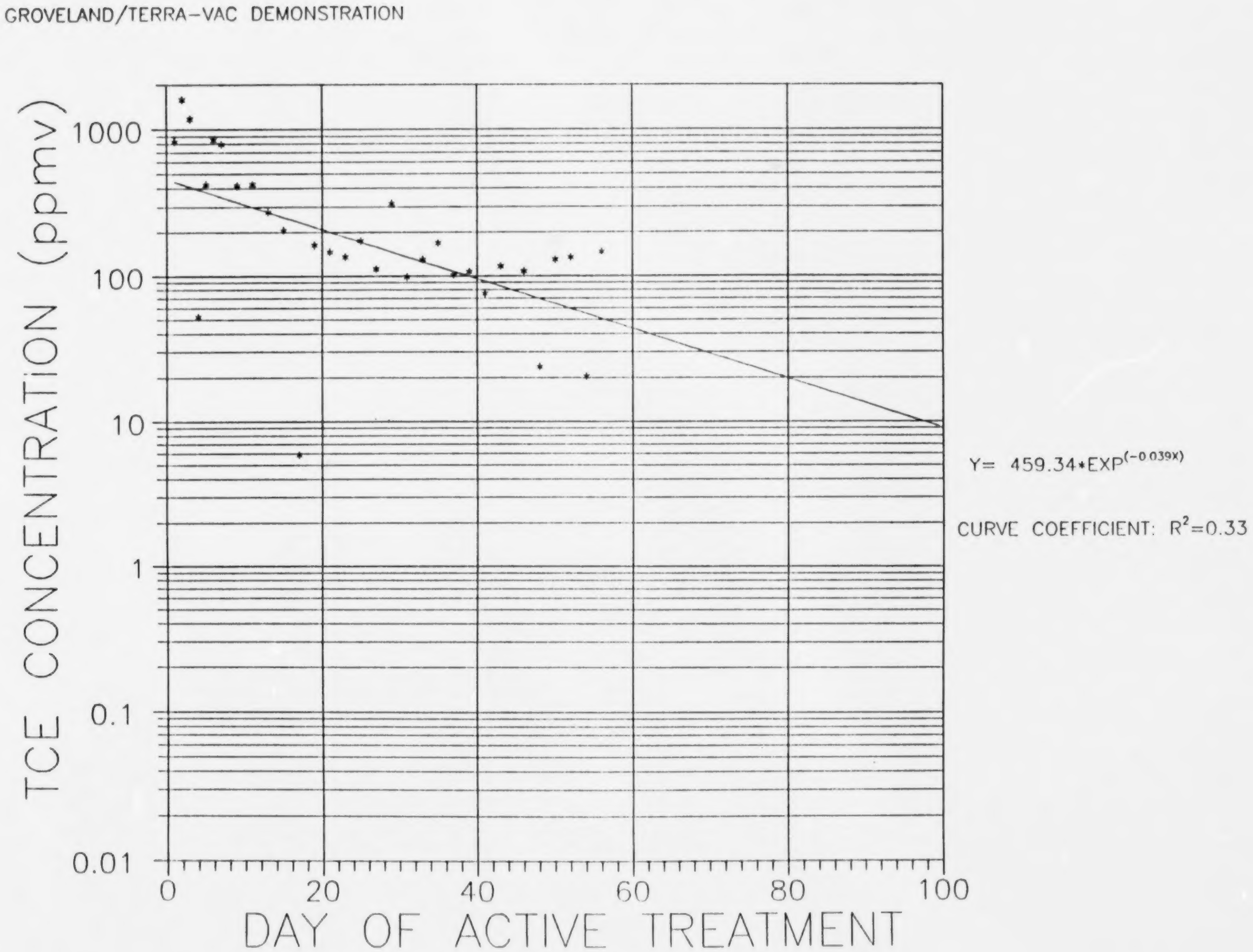


Figure 3-2M. Vacuum Monitoring Well #3 shallow.

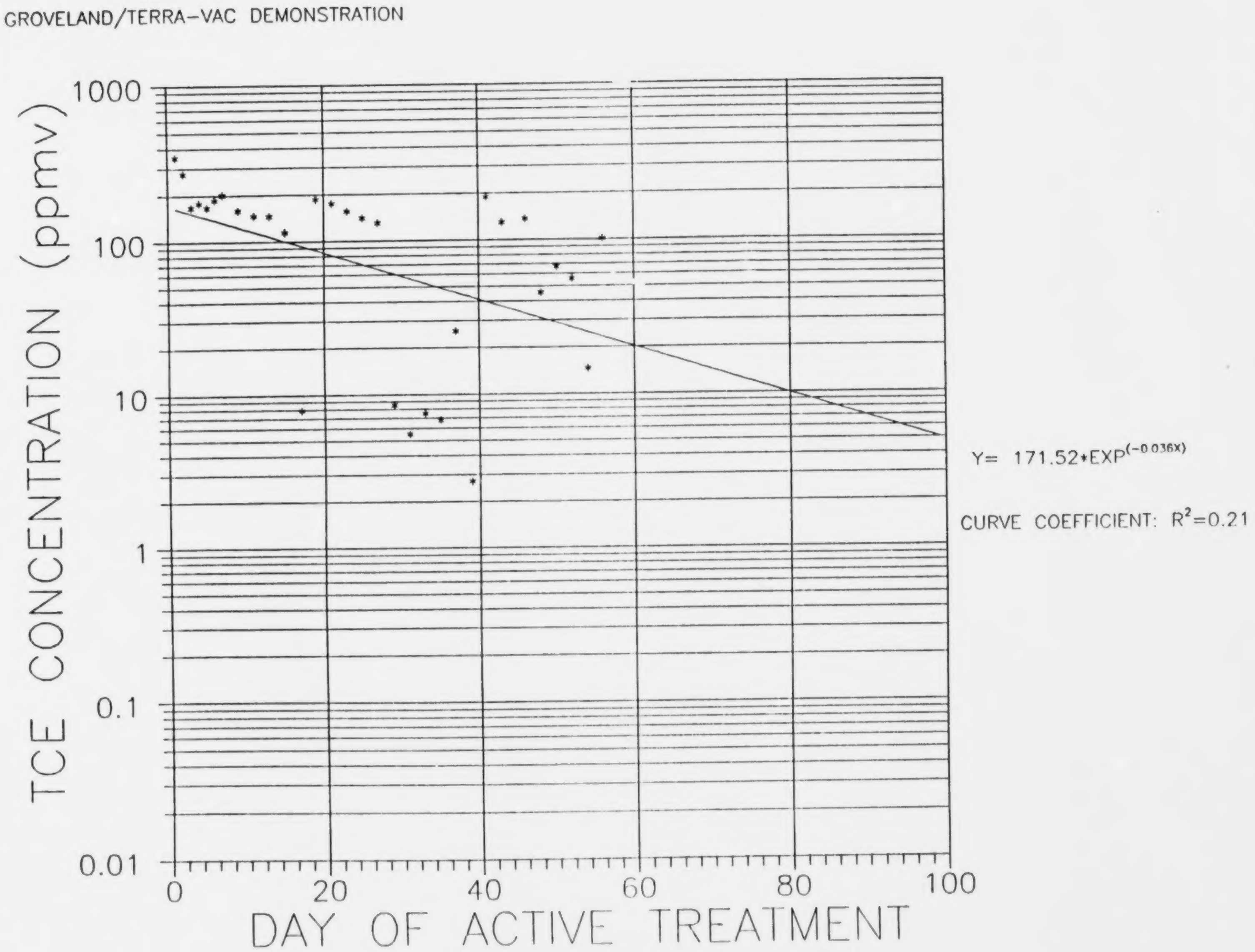


Figure 3-2N. Vacuum Monitoring Well #3 deep.

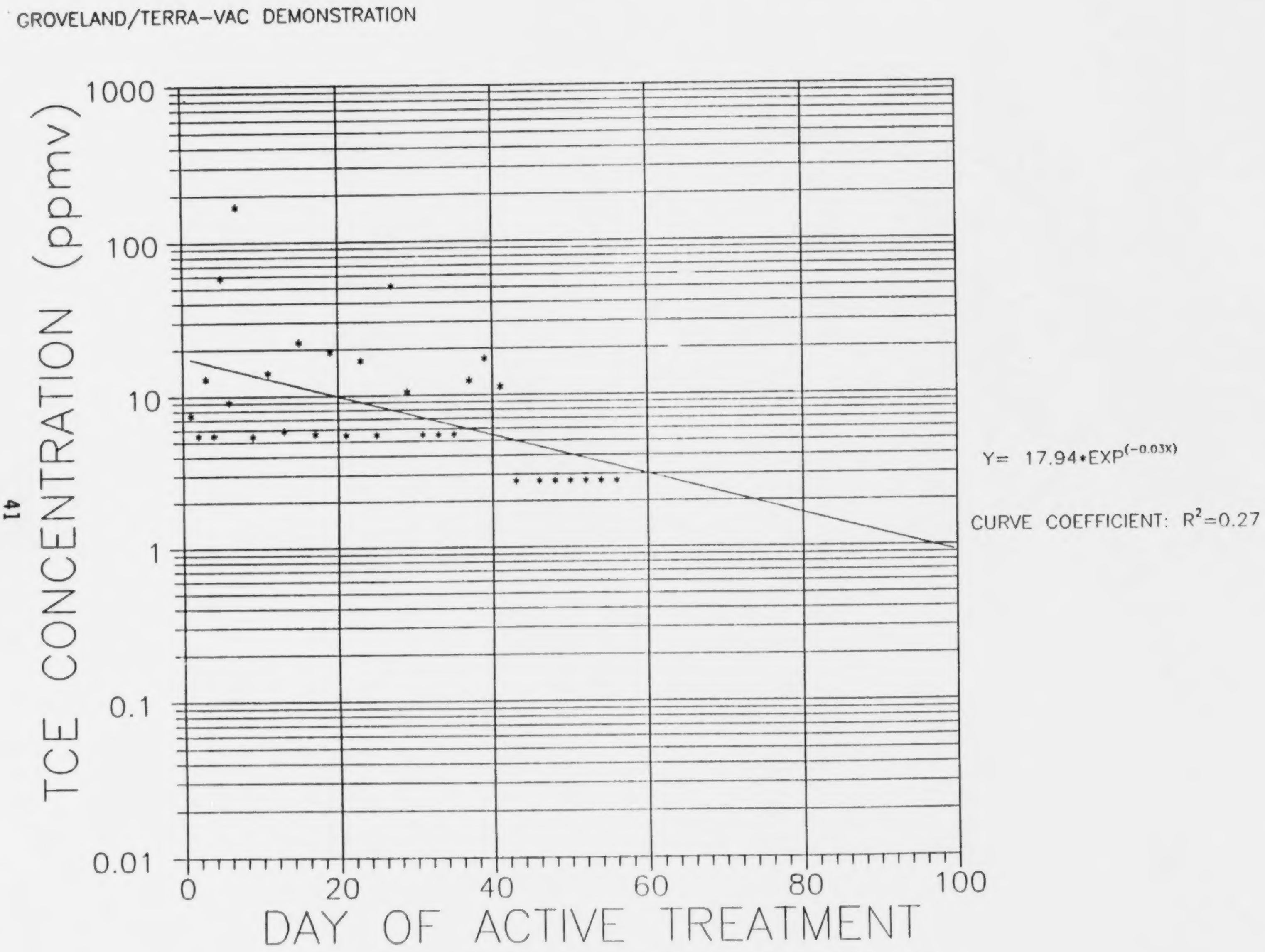


Figure 3-20. Vacuum Monitoring Well #4 shallow.

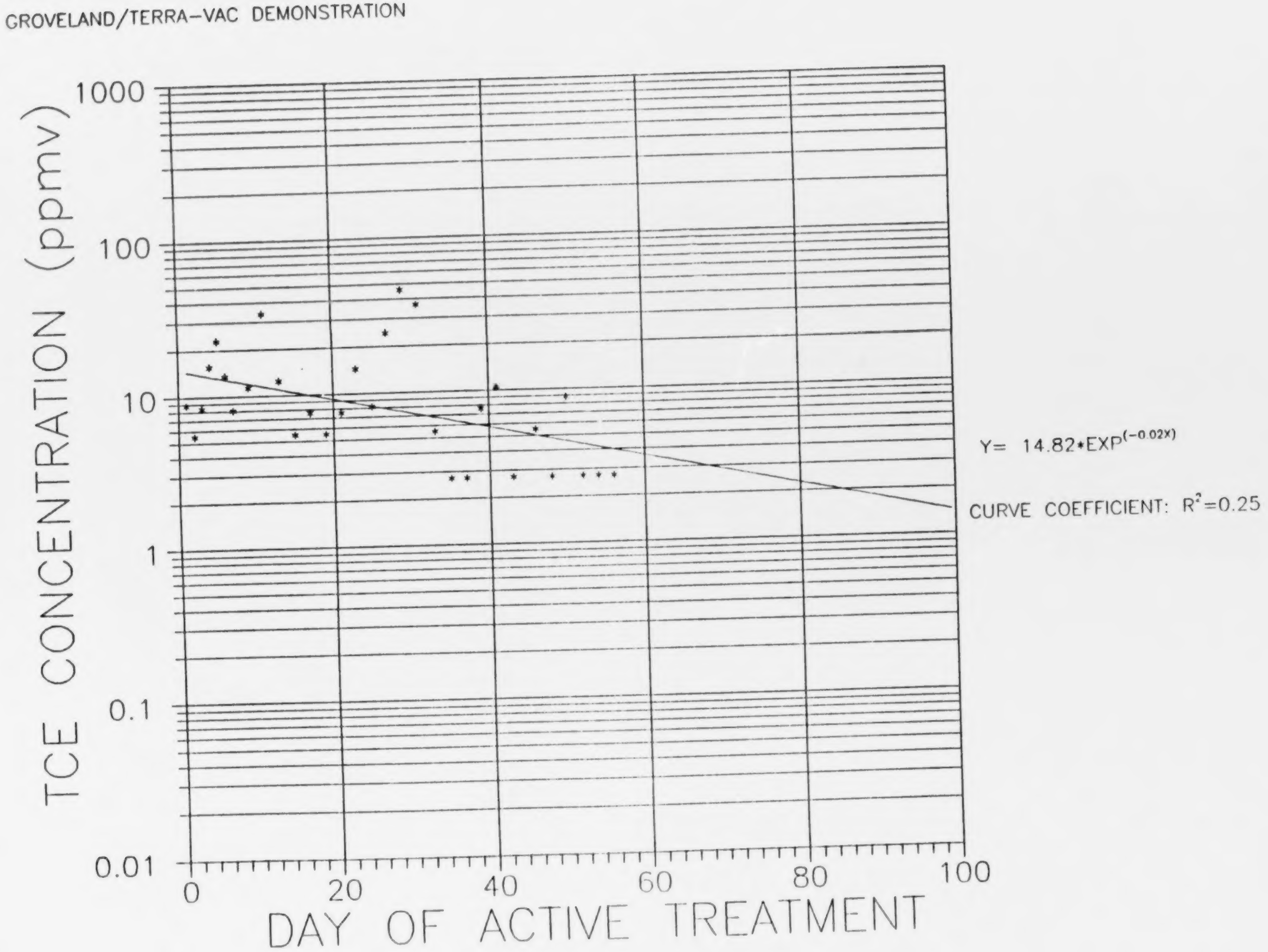


Figure 3-2P. Vacuum Monitoring Well #4 deep.

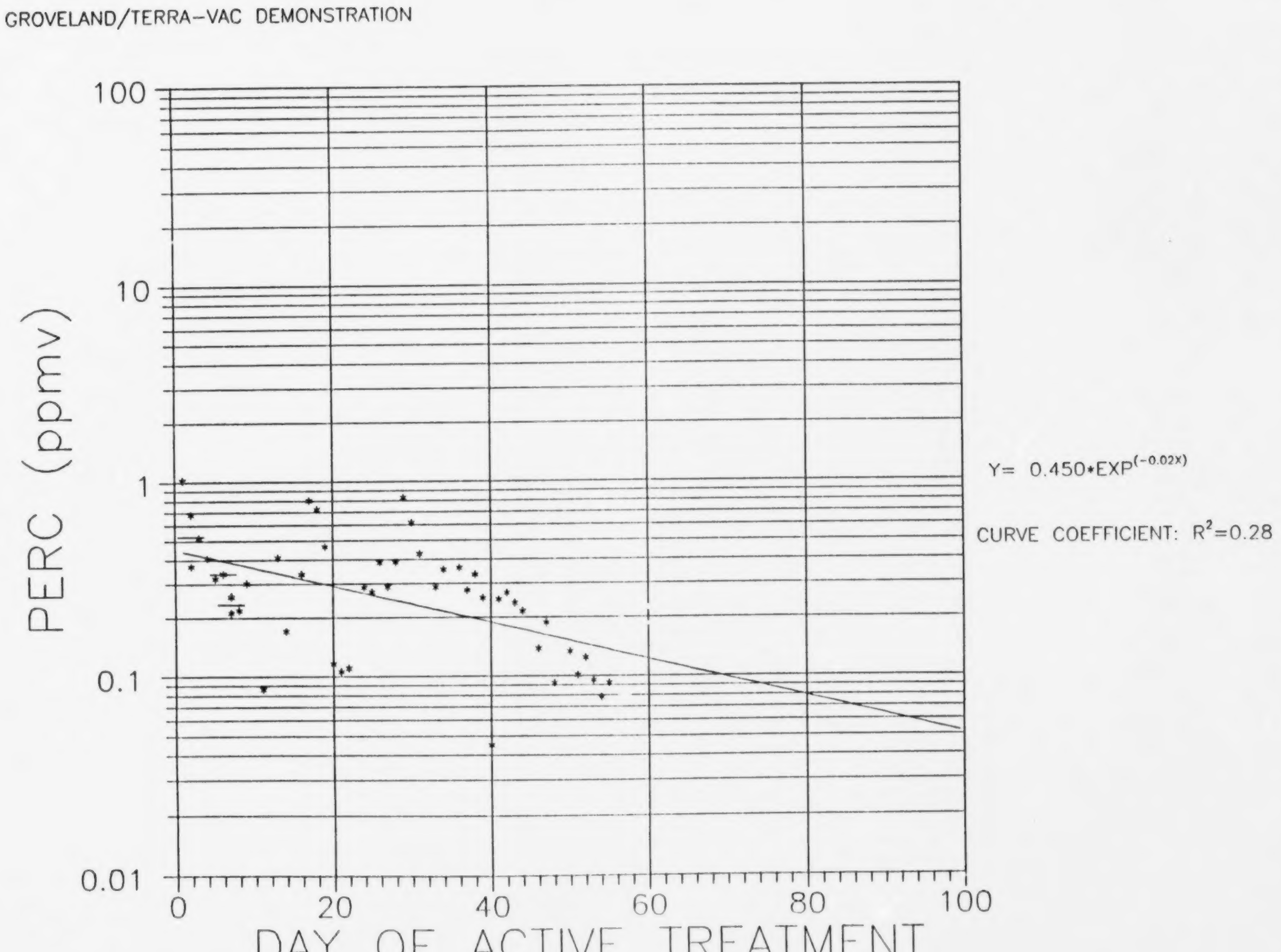


Figure 3-2Q. Extraction Well #1 shallow.

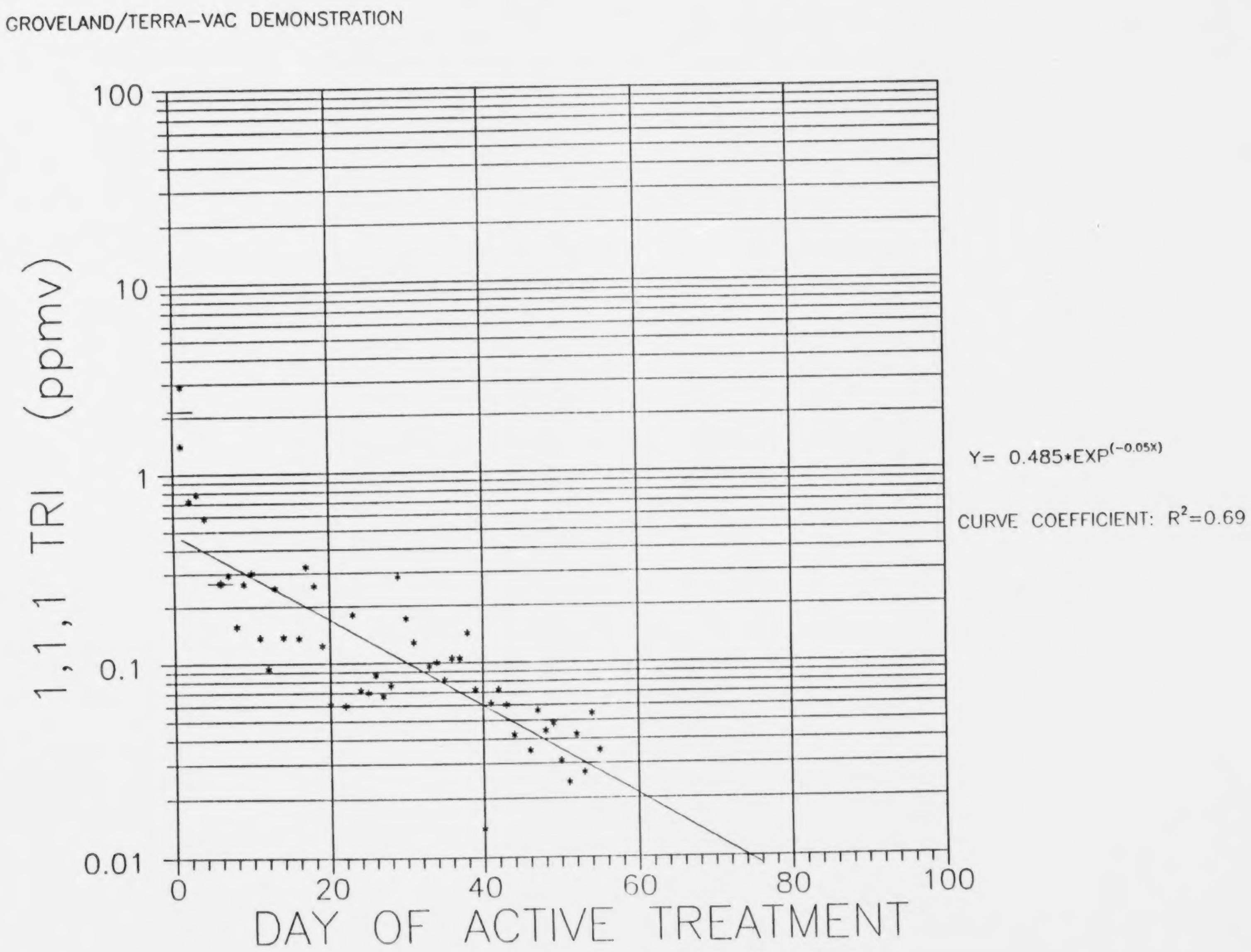


Figure 3-2R. Extraction Well #1 shallow.

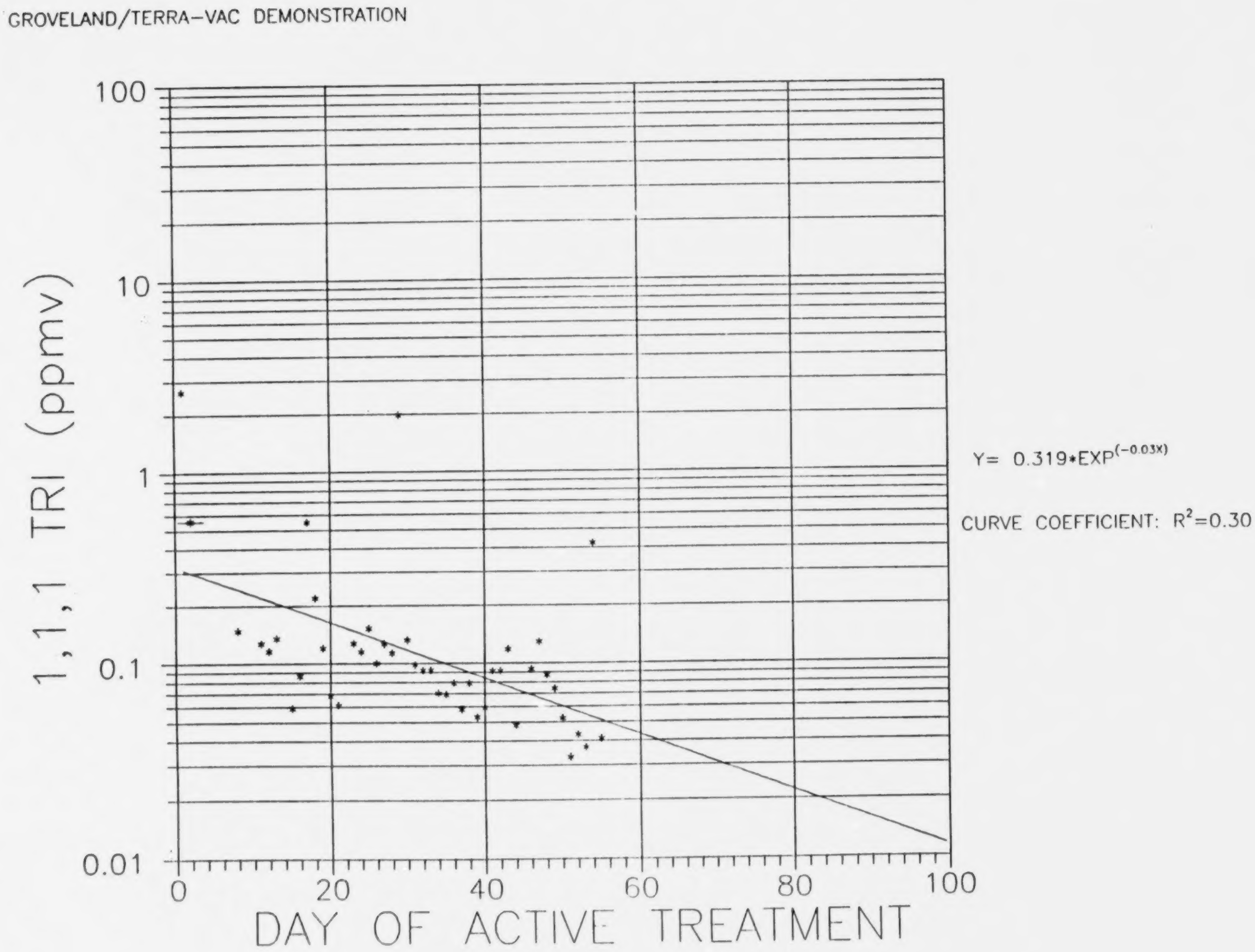


Figure 3-2S. Extraction Well #1 deep.

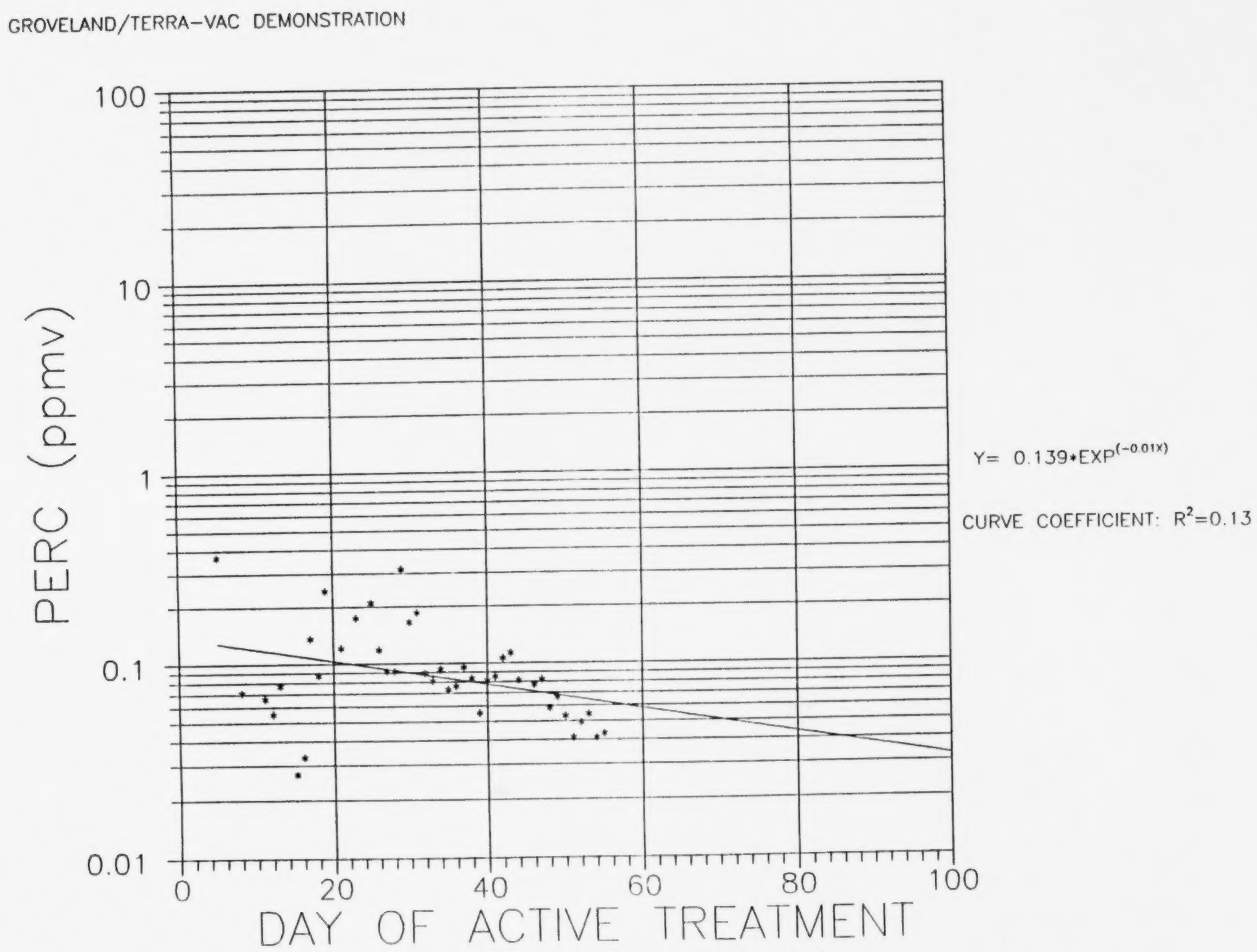


Figure 3-2T. Extraction Well #1 deep.

approximate 3 foot depths at specified locations around extraction Well No. 1 (Figure 2-2). The gas samples from the vacuum monitoring wells were also collected at these times. Three dimensional (3-D) plots were generated from the results of these sampling programs and are presented in this report as Figures 3-3a through 3-3c. A complete listing of these results are tabulated in Appendix D.

These plots were created by setting up a coordinate system around extraction Well No.1 (origin) to locate all sampling points. The location of each sample point (punch bars and shallow vacuum wells) becomes a function of "x" and "y". TCE (ppmv) concentration at each location is plotted on a "Z" scale resulting in a 3-D plot of TCE levels across the grid. Values of "Z" between data points and around the grid are generated by the Kriging method which uses given data points and a regional variable theory to generate values between sample locations.

SEPARATOR WATER

The moisture laden soil vapors that were extracted from the wells were routed to a tangential inlet separator tank to "knock out" entrained moisture. This separator tank was drained periodically into a 2,000 gallon holding tank. When the 2,000 gallon holding tank reached capacity, a contracted waste hauler would pump the contents into a tank truck for delivery to a treatment facility. Prior to the arrival of the tank truck, a sample of the tank contents was taken and analyzed for the five volatile compounds of interest. The results of these analyses are contained in Table 3-2.

CARBON CANISTERS

Soil vapors extracted from the wells passed through activated carbon canisters downstream from the separator tank prior to discharge to the atmosphere. Each canister contained 1,200 pounds of carbon to adsorb the volatile organics contained in the extracted gas. Canisters were set up in series with one canister (sometimes two) as the primary followed by a single secondary canister. The primary carbon outlet was sampled, with few exceptions, on a daily basis to monitor the concentrations and indicate when

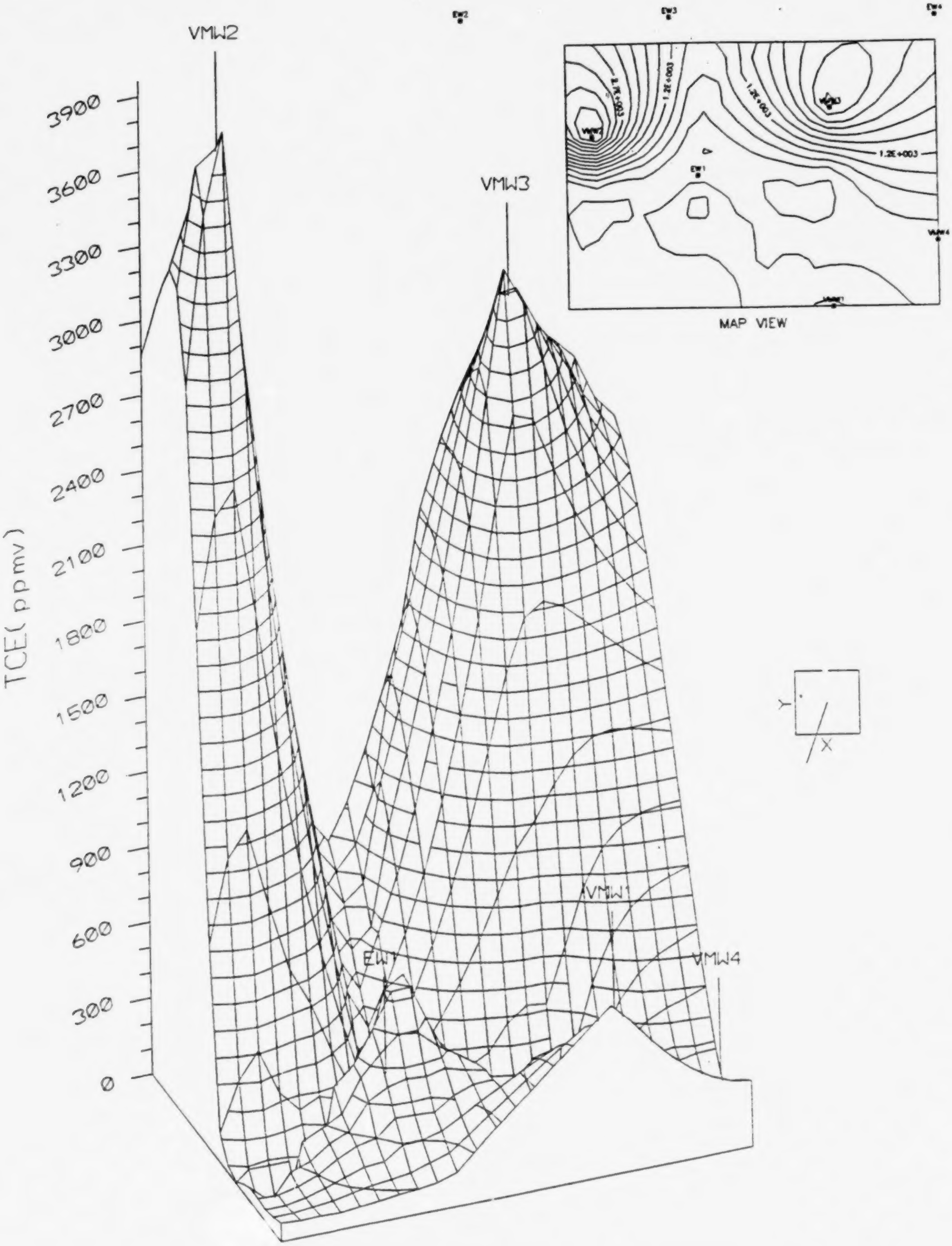


Figure 3-3A. Pretreatment shallow soil gas concentration.

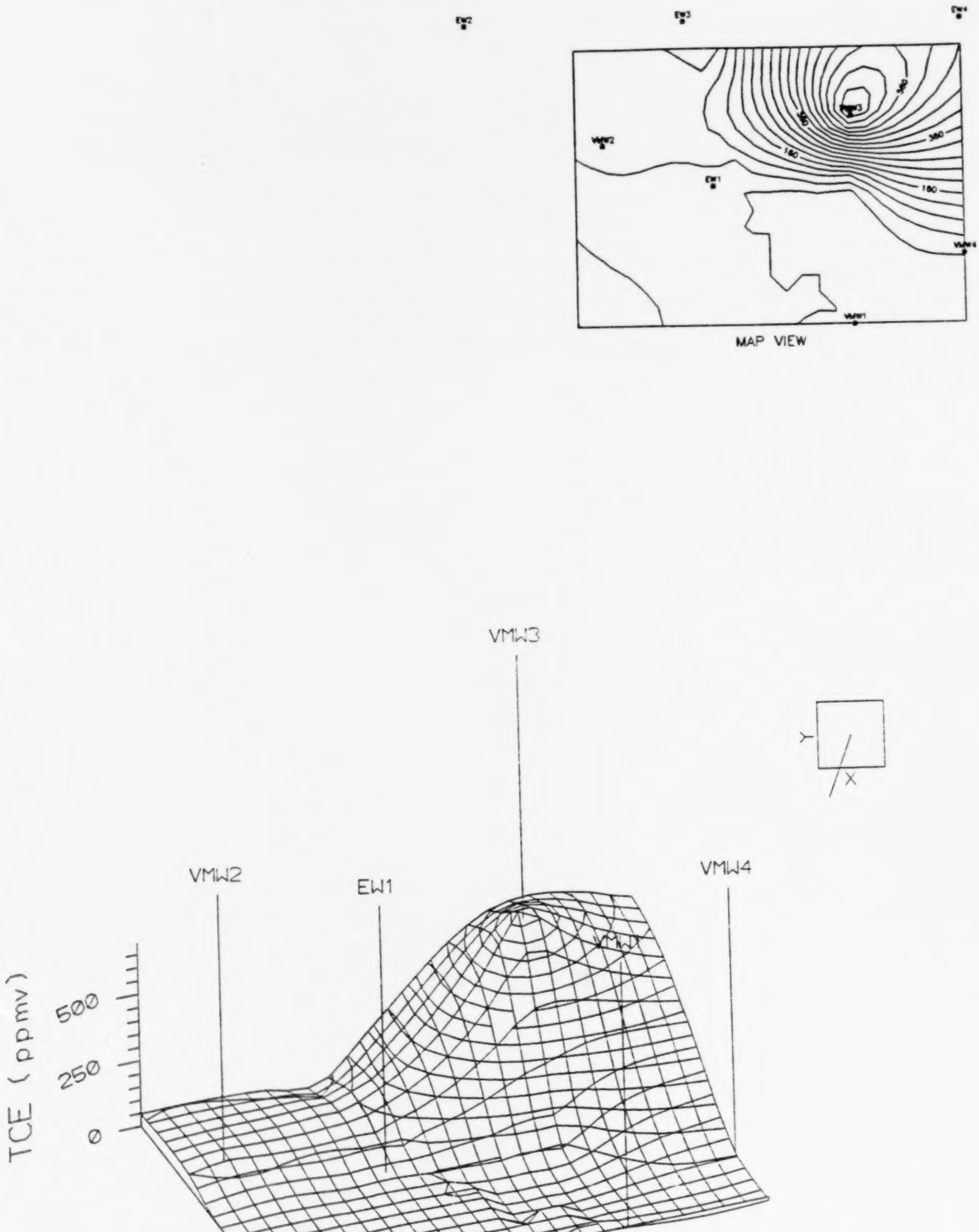
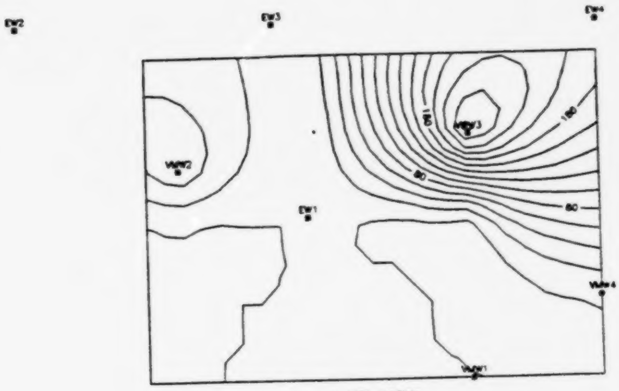


Figure 3-3B. Mid-treatment shallow soil gas concentration.



MAP VIEW

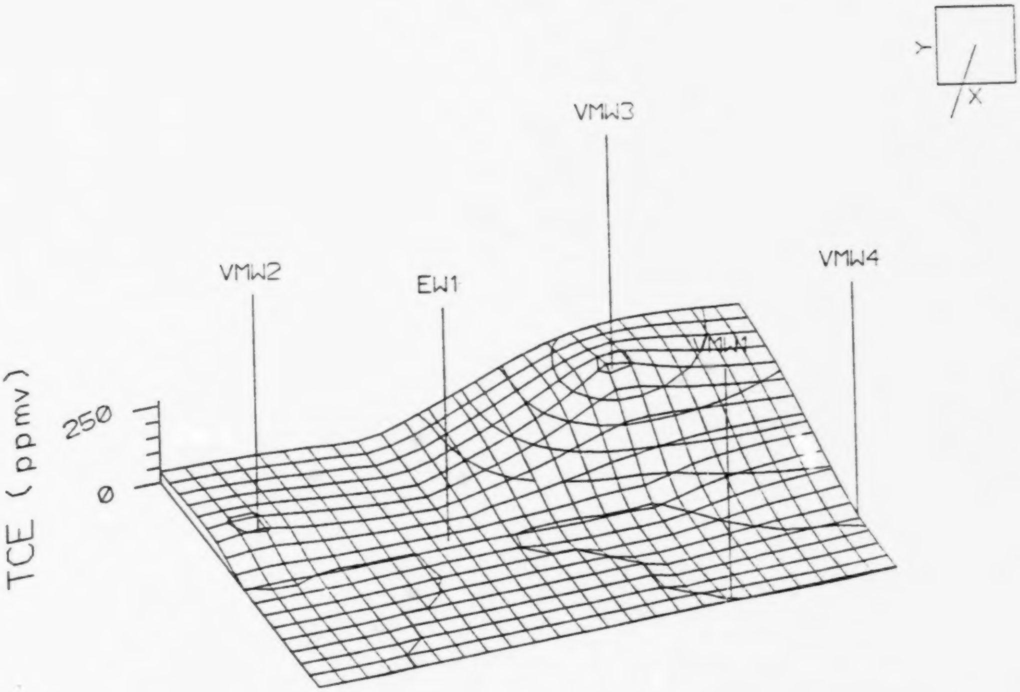


Figure 3-3C. Post treatment shallow soil gas concentration.

TABLE 3-2. GROVELAND SEPARATOR WATER GC DATA

SAMPLE I.D.	DATE of COLLECTION	CONCENTRATION (mg/L)					QUANTITATION LIMIT
		MC	DCE	TRI	TCE	PCE	
SEPDRAIN/12-16/1	12/16/87	ND	16	TRACE	96	ND	0.5
SEPDRAIN/1-11/1	1/11/88	TRACE	4.2	TRACE	35	ND	0.5
SEPDRAIN/1-12/1	1/12/88	TRACE	3.5	TRACE	26	ND	0.5
SEPDRAIN/1-13/1	1/13/88	TRACE	3.1	TRACE	22	ND	0.5
SEPDRAIN/1-15/1	1/15/88	TRACE	3.9	TRACE	29	ND	0.5
SEPDRAIN/2-23/1	2/23/88	ND	1.1	ND	92	ND	0.5
SEPDRAIN/3-6/1	3/6/88	TRACE	0.93	ND	8.8	ND	0.5
SEPDRAIN/3-22	3/20/88	TRACE	TRACE	ND	5.3	ND	0.05
SEPDRAIN/4-08	4/8/88	TRACE	TRACE	ND	3.3	ND	0.05

breakthrough was occurring. The Terra-Vac representative onsite periodically changed canisters based on the outlet concentration. Normally, primary outlet concentrations of 10-20 ppm were used as the threshold limit indicating that canisters should be changed. Once a canister was taken "off line" it was opened and a carbon sample collected for subsequent analysis for the five volatile compounds of interest. The results of these analyses are presented in Table 3-3.

CONCLUSIONS

The data collected during this project indicates that a measure of clean up did occur within the study area at the Valley Manufactured Products site. This is particularly supported by the well head concentration graphs (Figures 3.2a - 3.2t) which all show negative slopes. Along with the decrease in soil gas concentration, the results of the soil boring program indicate a general reduction in volatile organic soil contaminants across the site. The concentrations of volatiles adsorbed in the activated carbon (as indicated by the carbon analyses), as well as the calculated flux rates, also support the conclusion that contaminants were removed from the site.

In general, the amount of total volatiles collected on the activated carbon during the study periods was over 1,300 lbs of VOC. This figure was based on a total amount of carbon in each canister of 1,200 lbs. The actual amount of VOC collected may vary from the above amount if the canister contained more or less carbon. In support of the carbon analysis, the flux rates at the extraction well heads sum to approximately 1,300 lbs of VOC's.

Results of TOC and oil and grease analyses (Appendix A) have been reviewed and no clear cleanup trends could be established. Oil and grease and TOC were chosen as additional indicator parameters of gross organic contamination present at the site. The variability of the results, however, indicates that a variety of factors may be responsible for lack of clear trends. Analytical method variability and matrix interferences are two possible factors.

Several factors associated with this site contribute to make direct correlations and estimations of cleanup difficult. Among these factors are: variable geology, poorly defined contaminant plume, and amount of time allotted for this particular demonstration.

The geology of the site varies greatly from one end of the study area to the other (approximately 70 ft). The information contained in the drilling logs (Appendix B) and the engineering borings (Appendix C) indicate variability across the site and from zone to zone. These variations resulted in non-homogeneous samples which effect the analytical precision and coorelations of pre, mid, and post treatment soil boring results. The clay layer found at a depth of 10-15 feet varies in thickness, cohesion, and silt content. Also the amount and type of fill varies across the site from clean sands and gravel to brick and cinders. Differences among these distinct zones probably resulted in a regional (well to well) variable impact on overall effect of the process. In other words, the extractions of vapors around EW1, as compared to EW4 may have been impacted by the difference in the overlying sands and the difference in thickness and cohesion of the clay.

Previous studies conducted at the Groveland Site indicates that the contamination plume is at it's highest concentration directly beneath the concrete floor of the storage area with a general movement to the northeast toward Mill Pond. For this reason, the process was configured to isolate the main contamination plume and provide a relatively "clean area" around extraction Well No. 1 to assess the effectiveness of the process. This was to be accomplished by positioning the three barrier wells (Extraction Wells No. 2 3, and 4) between the known contamination plumes and extraction Well No. 1. Contaminants from the main plume would be drawn towards the barrier wells and not into the study area.

Several factors, however, occurred during the course of the study that raise questions about the placement of the barrier wells and their overall effectiveness in preventing contaminant migration towards the study area.

Results obtained from pretreatment soil analysis indicates an area of high volatiles contamination in the vicinity of monitoring Well No. 3; well within the influence of Extraction Well No. 1. The barrier wells, therefore, may have had little influence on this plume in respect to the influence induced by Extraction Well No. 1. As a result, as the study period progressed, Extraction Well No. 1 would have had a tendency to draw contaminants from the vicinity of monitoring Well No. 3, acutally resulting in higher concentrations (or a less dramatic reduction) for some of the mid and post treatment samples. Data obtained during this study does support this possibility.

In addition, Extraction Well No. 4, deep (barrier well) became inoperative on the 20th day of active treatment (due to siltation) and was therefore not a factor in preventing contaminant migration from the main plume for the last 40 days of active treatment. The actual impact of Extraction Well No. 4 deep's plugging is difficult to assess.

The fact that this well was meant to prevent contaminant migration into the study area, and was inoperative for two thirds of the active treatment period, can only lead to the speculation that contaminants could have migrated into the study area thereby impacting mid and post treatment results.

The duration of this demonstration over the course of this program was increased from 14 days to 28 days to 56 days and actually lasted 60 days. A 60-day program was enough time to develop trends, but may not have been enough time to make predictions of the amount of time until "clean" site would be achieved.

TABLE 3-3. GROVELAND CARBON CANISTER GC DATA

SAMPLE I.D.	DATE of CARBON CHANGE	CONCENTRATION (mg/g)				
		MC	DCE	TRI	TCE	PCE
CARBCAN 1914	2/16/88	<0.18	12	0.64	80a	<0.18
CARBCAN 1910	2/16/88	<0.18	5.2	<0.18	42b	<0.18
CARBCAN 1909	2/25/88	<0.18	2.5	<0.18	150a	<0.18
CARBCAN 1911	2/25/88	<0.18	3.5	0.26	120a	<0.18
CARBCAN 1912	3/15/88	<0.18	5.5	<0.18	120a	<0.18
CARBCAN 2037	3/15/88	<0.18	10	<0.18	50b	<0.18
CARBCAN 2039	3/24/88	<0.18	10	0.26	74b	<0.18
CARBCAN 2040	3/29/88	<0.18	2.8	<0.18	115a	<0.18
CARBCAN 1915	3/31/88	0.36	23	0.7	82a	<0.18
CARBCAN 1913	4/08/88	<0.18	6.6	0.42	81a	<0.18
CARBCAN 2038	4/10/88	<0.18	4.8	0.38	80a	<0.18
CARBCAN 2088	4/15/88	<0.18	2.8	<0.18	0.53	<0.18
CARBCAN 2089	4/18/88	<0.18	14	<0.18	<0.18	<0.18

a= value based on 1:10 dilution

b= value based on 1:5 dilution

SECTION 4

QUALITY ASSURANCE

INTRODUCTION

Quality Assurance/Quality Control (QA/QC) procedures followed in this program were based on routine laboratory and field practice and the HWERL Category II QA Project Plan (QAPP) entitled *Sampling and Analysis - Terra Vac, Inc. In Situ Vacuum Extraction Technology Site Demonstration Project, Valley Manufactured Products Site, Groveland, Massachusetts*. The QAPP was initially submitted September 1, 1987, and was approved by EPA after the submittal of Revision 1 on October 7, 1987. This QA section will detail areas where changes in laboratory and/or field procedures were made, and will compare the precision, accuracy, and completeness obtained during this program with the data quality objectives presented in the QAPP. To facilitate review of pertinent QC data, this section will follow the outline of the QAPP.

PROJECT ORGANIZATION AND RESPONSIBILITY

During the course of this program, several organizational changes were made. Mr. Patrick Ford replaced Mr. Thomas Nunno as the Program Manager, responsible for the overall program direction. Ms. Joanna Hall replaced Dr. Neil Ram with the overall responsibility of coordinating the analytical work, and Mr. Louis Macri replaced Mr. Mario Iannacone as Analytical QC Coordinator. In addition, one of Alliance's subcontractors, metaTRACE, Inc., was unable to conduct any analysis for soil TCLP. The TCLP samples were returned to Alliance and the analysis was conducted at the Bedford facilities,

QUALITY ASSURANCE OBJECTIVES

Precision, Accuracy and Completeness

Precision was estimated through analysis of duplicates and matrix spike duplicates. Accuracy was estimated through analysis of laboratory control sample and matix spikes. Completeness is estimated after review of the precision and accuracy data; completeness is the estimate of the generated data judged to be valid based upon comparison of the achieved precision and accuracy with the goals stated in the QA Plan.

Precision, accuracy and completeness for each analytical category are addressed in the following sections.

pH--

The precision of sampling and analysis for pH was estimated through the analysis of field-generated duplicates. Results of these analyses are presented in Table 4-1. Four out of twenty-four duplicate analyses exceeded the QA objective of plus or minus 0.2 pH units, resulting in 83 percent completeness for this analysis. The objective of 90 percent completeness was not met.

Oil and Grease--

Sampling and analysis precision for oil and grease was established through the analysis of field-generated duplicate samples. Table 4-2 provides a summary of sixteen analyses for which relative percent difference can be calculated. Ten duplicate analyses were not within the QA objective, resulting in 38 percent completeness for this analysis. The frequent occurrence of poor replication of results was investigated by analyzing triplicate aliquots of the B2/6 duplicates, sampled on 3/15/88. Results of these analyses (Table 4-3) verify the poor precision indicated by the single analysis of the duplicate sample. The analyst noted that it was difficult to obtain a representative aliquot from these samples because they were a mixture of oily soil and sand. Consequently, it was determined that the QA objective of plus or minus 30 percent relative percent difference was not reasonable for this sample matrix.

TABLE 4-1. PRECISION OF ANALYSIS OF SOIL SAMPLES FOR pH

Date Sampled	Sample ID	pH Value Initial	pH Value Duplicate	Allowable Range
12/01/87	MWS1/4	6.35	7.55 *	6.75 - 7.15
12/02/87	MWS1/9	6.30	7.65 *	6.78 - 7.18
12/07/87	EWS2/9	6.37	6.31	6.14 - 6.54
12/08/87	EWS3/9	5.88	6.05	5.77 - 6.17
12/09/87	EWS4/4	6.31	6.27	6.09 - 6.49
	EWS4/9	6.44	6.57	6.31 - 6.71
12/10/87	EWS1/11	6.00	5.82	5.71 - 6.11
	EWS1/5	6.97	6.74	6.66 - 7.06
12/11/87	MWS3/5	5.92	5.99	5.76 - 6.16
12/14/87	MWS4/7	5.84	5.54	5.49 - 5.89
3/15/88	B1/8	6.50	6.53	6.32 - 6.72
	B2/5	6.38	6.57	6.28 - 6.68
	B2/6	6.57	6.45	6.31 - 6.71
	B3/6	6.90	6.95	6.73 - 7.13
3/16/88	B4/7	6.96	7.02	6.79 - 7.19
4/19/88	B6/10	6.37	6.69	6.33 - 6.73
	B6/5	6.95	7.24	6.90 - 7.30
4/20/88	B7/11	6.50	6.87	6.49 - 6.89
	B7/8	6.52	6.31	6.22 - 6.62
4/21/88	B10/4	7.53	7.11 *	7.12 - 7.52
	B10/6	6.95	7.23	6.89 - 7.29
4/22/88	B11/9	6.69	6.52	6.41 - 6.81
	B12/5	6.15	6.40	6.08 - 6.48
4/25/88	B13/2	6.39	5.92 *	5.96 - 6.36

QA Objective = +/- 0.2 pH units from the mean.
* = Result is outside QA objective.

TABLE 4-2. PRECISION OF SOIL OIL AND GREASE ANALYSIS

Date Sampled	Sample ID	(mg/kg) Initial	Duplicate	Relative Percent Difference
12/01/87	MWS1/4	1300	1310	NC
12/02/87	MWS1/9	100	556	NC
12/07/87	EWS2/9	1620	1780	9
12/09/87	EWS3/9	1090	2330	73 *
	EWS4/4	16110	14060	14
	EWS4/9	416	465	11
12/10/87	EWS1/11	95	236	NC
12/11/87	MWS3/5	10350	2880	113 *
12/14/87	MWS4/7	1010	147	NC
3/15/88	B1/8	447	378	17
	B2/5	229	232	1
	B2/6	3942	1590	85 *
	B3/6	365	253	36 *
3/16/88	B4/7	ND	ND	NC
4/19/88	B6/10	603	1040	53 *
	B6/5	390	1010	89 *
4/20/88	B7/11	384	771	67 *
	B7/8	2420	272	160 *
4/21/88	B10/4	6330	5180	20
	B10/6	5580	2720	69 *
4/22/88	B11/9	ND	ND	NC
	B12/5	877	ND	NC
4/25/88	B13/2	21500	29500	31 *

QA Objective = +/- 30% RPD
* - RPD is outside control limits.
ND = Not Detected.
NC = Not Calculated. Precision values are calculated only for concentrations greater than twice the quantitation limit.

TABLE 4-3. RESULTS OF TRIPLICATE ANALYSIS OF SOIL SAMPLES FOR OIL AND GREASE

Sample Location	Sampling Date	Concentration (mg/Kg)				RSD
		A	B	C	Average	
B2/6 #1	3/15/88	3940	2640	2630	3070	20
B2/6 #2	3/15/88	1590	4560	2480	2877	43

Accuracy of oil and grease analysis was determined by the analysis of Laboratory Control Samples (LCS), generated from a U.S. EPA Municipal Digested Sludge. An LCS was analyzed for every 20 program samples. Results of these analyses are provided in Table 4-4. All data are within the QA objective of 80 to 120 percent recovery.

TOC--

TOC precision was provided via the analysis of field duplicates. Table 4-5 is a summary of the results obtained. QA goals were not listed for this non-critical analysis, however, results in Table 4-5 indicate evidence of sample non-homogeneity similar to that experienced with the oil and grease analysis.

Table 4-6 shows the accuracy obtained for the determination of TOC through the analysis of LCSs. These samples were generated utilizing U.S. EPA/EMSL QC samples. QA goals were not provided for this analysis.

Soil and Process Gas

FID--

Trans-1,2-dichloroethylene (DCE) and trichloroethylene (TCE) were determined in field samples at the onsite location by gas chromatography with flame ionization detection (GC/FID). Precision has been estimated through the analysis of duplicate samples and through duplicate injection of aliquots of single samples. Accuracy has been estimated through the analysis of laboratory control samples.

A total of 148 samples (Table 4-7) were analyzed in duplicate, i.e., single samples each analyzed twice. These analyses provide an estimate of the analytical precision independent of the sampling precision. Of the 148 samples analyzed for TDE, 38 sample concentrations are high enough to provide an estimate of precision. (The other 111 sample concentrations are less than twice the quantitation limit). Of the available 38 precision estimates for DCE, all are within the QA objective of plus-or-minus 50 relative percent difference. The average precision for these 38 DCE precision values is 3 relative percent difference. Of the 148 samples analyzed for TCE, 108 sample concentrations are high enough to provide an estimate of precision. Of the available 108 TCE precision estimates, all are within the QA objective. The average precision for these 108 TCE precision values is 4 relative percent difference.

TABLE 4-4. RESULTS OF ANALYSIS OF OIL AND GREASE LCSs

Concentration (mg/Kg)		Percent Recovery
Reported	Expected	
55930	52700	106
49110	52700	93
48340	52700	92
49820	52700	95
51450	52700	98
53950	52700	102
52900	52700	100
54300	52700	103

Average percent recovery = 99 +/- 5

QA Objective = 80 - 120 %Recovery

TABLE 4-5. PRECISION OF ANALYSIS OF SOIL FOR TOC

Date	Sample ID	(mg/kg) Initial	Duplicate	Relative Percent Difference
12/01/87	MWS1/5	910	600	41
12/02/87	MWS1/8	240	340	34
12/07/87	EWS2/11	5080	12600	5
12/09/87	EWS4/10	1290	1260	2
	EWS4/5	20000	22200	10
12/10/87	EWS1/7	8540	20700	83
	EWS1/8	1160	1400	19
12/11/87	MWS3/4	22000	27300	22
12/14/87	MWS4/4	7250	8380	14
3/15/88	B1/8	2100	1650	24
	B2/5	1020	1140	11
	B2/6	1970	829	82
	B3/6	617	657	6
3/16/88	B4/7	1240	1100	12
4/19/88	B6/10	2930	4220	36
	B6/5	383	438	13
4/20/88	B7/11	1070	6490	143
	B7/8	1590	768	70
4/21/88	B10/4	5980	3360	56
	B10/6	4760	5900	21
4/22/88	B11/9	154	276	57
	B12/5	3820	3580	6
4/25/88	B13/2	10800	11300	5

Average RPD = -12 +- 50

TABLE 4-6. ACCURACY OF SOIL TOC ANALYSIS

Concentration (mg/Kg)		Percent Recovery
Reported	Expected	
1993	2000	100
2017	2000	101
1975	2000	99
1992	2000	100
2009	2000	100
2016	2000	101
2011	2000	101
1980	2000	99
2019	2000	101
2051	2000	103
1994	2000	100
1979	2000	99
2030	2000	102
1975	2000	99
1966	2000	98
1947	2000	97
2073	2000	104
2036	2000	102
2032	2000	102
2044	2000	102

Average percent recovery = 100 +/- 2
QA Objective = 80 - 120 %Recovery

TABLE 4-7. PRECISION RESULTS OF ON-SITE REPLICATE SAMPLE INJECTION AND ANALYSIS (GC/FID)
(ug/cubic meter)

Sampling Date	Sample ID	t-1,2-Dichloroethylene (DCE) Original	t-1,2-Dichloroethylene (DCE) Duplicate	Relative Percent Difference	Trichloroethylene (TCE) Original	Trichloroethylene (TCE) Duplicate	Relative Percent Difference
16-Dec-87	EWG4S-5	38000	38000	NC	570000	590000	3%
	PB-06	1300000	1300000	0%	1400000	1400000	0%
17-Dec-87	EWG3S-4	560000	560000	0%	14000000	14000000	0%
	EWG3S-8	290000	300000	3%	7400000	7900000	7%
18-Dec-87	EWG4D-1	320000	320000	0%	7900000	7800000	1%
	EWG4D-7	220000	220000	0%	3200000	3200000	0%
07-Jan-88	EWG3D-1	ND	ND	NC	ND	ND	NC
08-Jan-88	EWG1S-3	900000	850000	6%	12000000	11000000	9%
	PGSEPIN-1	370000	290000	24%	7700000	5000000	43%
11-Jan-88	EWG2S-1	100000	86000	15%	2000000	1600000	22%
	PGSEPIN-1	330000	310000	6%	6400000	6100000	5%
	VMWG4S-1	ND	ND	NC	43000	51000	NC
12-Jan-88	EWG2S-1	81000	77000	NC	1500000	1400000	7%
	EWG4D-1	410000	400000	2%	2800000	2800000	0%
13-Jan-88	EWG1S-1	180000	160000	12%	2800000	2400000	15%
	GTVFBB-1	ND	ND	NC	34000	35000	NC
	VMWG2S-1	63000	65000	NC	1800000	1700000	6%
15-Jan-88	EWG1D-2	ND	ND	NC	140000	130000	7%
	EWG2S-1	ND	ND	NC	280000	360000	25%
	EWG4D-1	400000	400000	0%	2500000	2500000	0%
	VMWG1D-1	ND	ND	NC	97000	99000	2%
11-Feb-88	EWG1D/1	92000	74000	NC	1300000	920000	34%
	PGSECOND	ND	ND	NC	73000	84000	14%
	VMWG1D/1	ND	ND	NC	36000	39000	NC
	VMWG4D/1	ND	ND	NC	48000	49000	NC
12-Feb-88	EWG1S/2	36000	36000	NC	730000	730000	0%
	EWG2D/1	43000	41000	NC	400000	390000	3%
	VMWG2D/1	110000	110000	0%	450000	430000	5%
13-Feb-88	EWG1S/2	36000	36000	NC	740000	740000	0%
	EWG2D/1	110000	110000	0%	410000	430000	5%
	PGSEPIN	86000	86000	NC	1400000	1400000	0%
	VMWG4S/1	ND	ND	NC	70000	73000	4%
14-Feb-88	EWG3D/1	250000	250000	0%	2100000	2100000	0%
	VMWG3S/1	ND	ND	NC	280000	290000	4%
	VMWG4D/1	ND	ND	NC	84000	94000	11%
	VMWG4S/1	ND	ND	NC	ND	ND	NC
15-Feb-88	EWG1D/1	ND	ND	NC	690000	760000	10%
	EWG1S/2	ND	ND	NC	540000	540000	0%
	VMWG1D/1	ND	ND	NC	ND	28000	NC
	VMWG3S/1	140000	140000	0%	2300000	2300000	0%
16-Feb-88	EWG1D/2	ND	ND	NC	160000	160000	0%
	EWG3S/1	88000	88000	NC	4300000	4300000	0%
	VMWG3S/1	240000	240000	0%	4600000	4500000	2%
17-Feb-88	EWG1D/2	ND	ND	NC	140000	150000	7%
	EWG3D/1	120000	110000	9%	1300000	1300000	0%
	VMWG3D/1	60000	59000	NC	1100000	1100000	0%
	VMWG4D/1	ND	ND	NC	44000	48000	NC
18-Feb-88	EWG3S/1	ND	ND	NC	1100000	1100000	0%
	EWG4D/1	120000	120000	0%	1500000	1500000	0%
19-Feb-88	VMWG1S/1	ND	ND	NC	57000	64000	NC
	VMWG4S/1	ND	ND	NC	29000	35000	NC
20-Feb-88	EWG2S/1	ND	ND	NC	450000	430000	5%
	EWG3D/1	65000	66000	NC	660000	660000	0%
21-Feb-88	VMWG2D/1	ND	ND	NC	58000	58000	NC
22-Feb-88	EWG2D/1	52000	51000	NC	100000	100000	0%
23-Feb-88	VMWG1D/1	ND	ND	NC	ND	ND	NC
	VMWG4D/1	ND	ND	NC	67000	72000	NC
24-Feb-88	EWG2S/1	51000	51000	NC	110000	140000	24%
	EWG4D/1	62000	60000	NC	2200000	2200000	0%
25-Feb-88	VMWG1D/1	ND	ND	NC	ND	48000	NC
	VMWG4S/1	ND	ND	NC	120000	130000	8%
26-Feb-88	EWG3D/1	49000	49000	NC	320000	320000	0%
	PGCARBOUT	ND	ND	NC	ND	ND	NC
29-Feb-88	VMWG2S/1	ND	ND	NC	550000	540000	2%
	VMWG4D/1	ND	ND	NC	41000	45000	NC
01-Mar-88	EWG3S/1	41000	42000	NC	2500000	2500000	0%
	PGSEPIN	36000	36000	NC	1100000	1100000	0%

TABLE 4-7. PRECISION RESULTS OF ON-SITE REPLICATE SAMPLE INJECTION AND ANALYSIS (GC/FID)
(ug/cubic meter)

Sampling Date	Sample ID	t-1,2-Dichloroethylene (DCE)		Relative Percent Difference	Trichloroethylene (TCE)		Relative Percent Difference
		Original	Duplicate		Original	Duplicate	
02-Mar-88	EWG1D/1	ND	ND	NC	110000	120000	9%
	VMWG4D/1	ND	ND	NC	ND	ND	NC
03-Mar-88	EWG2S/1	ND	ND	NC	200000	200000	0%
04-Mar-88	VMWG2S/1	ND	ND	NC	160000	160000	0%
	VMWG3D/1	130000	130000	0%	950000	940000	1%
05-Mar-88	EWG2D/1	53000	52000	NC.	120000	120000	0%
	EWG4S/1	180000	180000	0%	8300000	8400000	1%
06-Mar-88	VMWG2S/1	ND	ND	NC	160000	160000	0%
	VMWG4D/1	ND	ND	NC	78000	80000	3%
07-Mar-88	EWG2D/1	53000	53000	NC	490000	500000	2%
08-Mar-88	EWG1D/1	ND	ND	NC	220000	220000	0%
	VMWG2S/1	ND	ND	NC	130000	130000	0%
	VMWG4S/1	ND	ND	NC	ND	ND	NC
09-Mar-88	EWG3D/1	63000	63000	NC	710000	710000	0%
10-Mar-88	VMWG1D/1	ND	ND	NC	ND	ND	NC
	VMWG3D/1	96000	95000	1%	710000	700000	1%
	VMWG4S/1	ND	ND	NC	280000	280000	0%
11-Mar-88	EWG2S/1	ND	ND	NC	320000	340000	6%
	EWG4S/1	170000	170000	0%	7500000	7400000	1%
15-Mar-88	VMWG1D/1	ND	ND	NC	ND	70000	NC
16-Mar-88	PB8/1	ND	ND	NC	160000	160000	0%
17-Mar-88	PB11/1	530000	510000	4%	510000	500000	2%
18-Mar-88	EWG3S/1	55000	55000	NC	2600000	2600000	0%
	VMWG1D/1	ND	ND	NC	ND	ND	NC
	VMWG4D/1	ND	ND	NC	250000	250000	0%
19-Mar-88	EWG2D/1	53000	53000	NC	110000	110000	0%
	EWG4D/1	200000	200000	0%	1200000	1200000	0%
20-Mar-88	VMWG2D/1	ND	ND	NC	500000	520000	4%
	VMWG4D/1	ND	ND	NC	200000	240000	18%
21-Mar-88	EWG2D/1	47000	45000	NC	90000	120000	29%
	EWG4D/1	110000	110000	0%	710000	710000	0%
22-Mar-88	VMWG1S/1	ND	ND	NC	47000	71000	NC
	VMWG3S/1	120000	120000	0%	700000	740000	6%
23-Mar-88	EWG2S/1	ND	ND	NC	180000	210000	15%
	EWG4D/1	92000	91000	1%	720000	710000	1%
24-Mar-88	VMWG2S/1	ND	ND	NC	180000	180000	0%
	VMWG4D/1	ND	ND	NC	ND	ND	NC
25-Mar-88	EWG4D/1	57000	54000	NC	550000	520000	6%
26-Mar-88	VMWG2D/1	ND	ND	NC	360000	350000	3%
	VMWG4D/1	ND	ND	NC	ND	ND	NC
27-Mar-88	EWG3S/1	ND	ND	NC	1900000	1900000	0%
28-Mar-88	EWG1D/1	ND	ND	NC	32000	ND	NC
	VMWG3S/1	98000	98000	0%	580000	570000	2%
29-Mar-88	EWG2D/1	ND	ND	NC	82000	81000	1%
	EWG4D/1	ND	ND	NC	ND	ND	NC
30-Mar-88	EWG1D/1	ND	ND	NC	73000	79000	8%
	VMWG3D/1	130000	130000	0%	1000000	1000000	0%
31-Mar-88	EWG2D/1	ND	ND	NC	72000	73000	1%
	EWG4D/1	99000	97000	2%	860000	840000	2%
01-Apr-88	VMWG1S/1	ND	ND	NC	ND	ND	NC
	VMWG3D/1	93000	92000	1%	700000	700000	0%
02-Apr-88	EWG4D/1	120000	120000	0%	1000000	990000	1%
04-Apr-88	VMWG2S/1	ND	ND	NC	78000	78000	0%
	VMWG4D/1	ND	ND	NC	ND	ND	NC
05-Apr-88	EWG3D/1	52000	51000	NC	500000	490000	2%
	EWG4D/1	ND	ND	NC	ND	30000	NC
06-Apr-88	VMWG1D/1	ND	ND	NC	ND	58000	NC
	VMWG4D/1	ND	ND	NC	ND	ND	NC
07-Apr-88	EWG2D/1	43000	42000	NC	86000	86000	0%
	PGSEPIN	ND	ND	NC	580000	510000	13%
08-Apr-88	VMWG1S/1	ND	ND	NC	ND	ND	NC
	VMWG3D/1	68000	65000	NC	360000	350000	3%
09-Apr-88	EWG2D/1	43000	43000	NC	91000	94000	3%
	EWG4S/1	130000	130000	0%	5300000	5200000	2%
10-Apr-88	VMWG1D/1	ND	ND	NC	ND	87000	NC
11-Apr-88	EWG1D/1	ND	ND	NC	43000	58000	NC
	EWG4S/1	1*0000	110000	0%	4600000	4500000	2%

TABLE 4-7. PRECISION RESULTS OF ON-SITE REPLICATE SAMPLE INJECTION AND ANALYSIS (GC/FID)
(ug/cubic meter)

Sampling Date	Sample ID	t-1,2-Dichloroethylene (DCE) Original	t-1,2-Dichloroethylene (DCE) Duplicate	Relative Percent Difference	Trichloroethylene (TCE) Original	Trichloroethylene (TCE) Duplicate	Relative Percent Difference
12-Apr-88	EWG1D/1	ND	ND	NC	32000	31000	NC
	VMWG2S/1	ND	ND	NC	110000	100000	10%
	VMWG4S/1	ND	ND	NC	ND	ND	NC
13-Apr-88	EWG4S/1	92000	91000	1%	3500000	3500000	0%
	PGCARBOUT	110000	100000	10%	65000	62000	5%
14-Apr-88	VMWG2S/1	ND	ND	NC	130000	130000	0%
	VMWG3D/1	81000	80000	NC	540000	540000	0%
15-Apr-88	EWG4D/1	130000	130000	0%	1500000	1600000	6%
18-Apr-88	EWG3S/1	ND	ND	NC	480000	470000	2%
	PGSEPIN	ND	ND	NC	450000	460000	2%
20-Apr-88	PB10/1	ND	ND	NC	ND	ND	NC
	PB5/1	ND	ND	NC	ND	ND	NC
21-Apr-88	FB8/1	ND	ND	NC	ND	ND	NC
22-Apr-88	VMWG4S/1	ND	ND	NC	ND	ND	NC
			Average RPD =	2.6 +/- 5.2		Average RPD =	4.3 +/- 7.4

Note: ND = "Not Detected", i.e., less than the quantitation limit.
Quantitation limits: DCE - 45,000 ug/cubic-meter, TCE - 30,000 ug/cubic-meter.

NC = "Not Calculated".
Precision values are calculated only for concentration values more than twice the quantitation limit.

A total of 75 samples (Table 4-8) were sampled in duplicate and analyzed. These analyses provide an estimate of the sampling and analytical precision. Of the 75 samples analyzed for DCE 16 sample concentrations are high enough to provide an estimate of precision. Of the available 16 DCE precision estimates, all are within the QA objective. The average precision for these 16 DCE precision values is 8 relative percent difference. Of the available 53 TCE precision values, 50 (94 percent) are within the QA objective. The average precision for these 53 TCE precision values is 10 relative percent difference.

Analytical accuracy for methylene chloride (MC), DCE, and TCE has been estimated through the analysis of 150 laboratory control samples (Table 4-9). The QA objective is 100 plus-or-minus 50 percent recovery of these compounds spiked into nitrogen. Of the 150 recovery values for MC, 148 (99 percent) met the QA objective. For DCE 148 values (99 percent) met the QA objective. For TCE, 146 values (97 percent) met the QA objective.

Precision and accuracy completeness values for GC/FID onsite analyses ranged from 94 percent to 100 percent which meets the QA completeness objective of 90 percent.

ECD--

1,1,1-Trichloroethane (TRI) and Tetrachloroethylene (PCE) were determined in field samples at the onsite laboratory location by gas chromatography with electron capture detection (GC/ECD). Precision has been estimated through the analysis of duplicate samples and through duplicate injection of aliquots of single samples. Accuracy has been estimated through the analysis of laboratory control samples.

A total of 134 samples (Table 4-10) were analyzed in duplicate (i.e., single samples each analyzed twice). These analyses provide an estimate of the analytical precision independent of the sampling precision. Of the 134 samples analyzed for TRI, 75 sample concentrations are high enough to provide an estimate of precision (the other 59 sample concentrations are less than twice the quantitation limit). Of the available 75 precision estimates for TRI, 74 (99 percent) are within the QA objective of plus-or-minus 50 relative percent difference. The average precision for these 75 TRI precision values

TABLE 4-8. PRECISION RESULTS OF ON-SITE DUPLICATE SAMPLE COLLECTION AND ANALYSIS (GC/FID)
(ug/cubic meter)

Sampling Date	Sample ID	t-1,2-Dichloroethylene (DCE)		Relative Percent Difference	Trichloroeloroethylene (TCE)		Relative Percent Difference
		Original	Duplicate		Original	Duplicate	
15-Dec-87	VMWG2D-1	310000	290000	7%	5200000	5000000	4%
17-Dec-87	EWG3S-7	540000	560000	4%	14000000	14000000	0%
07-Jan-88	EWG2D-3	150000	150000	0%	3600000	3600000	0%
	EWG3D-5	160000	150000	6%	2800000	2600000	7%
09-Jan-88	VMWG3S-1	2600000	2700000	4%	20000000	20000000	0%
15-Jan-88	EWG1S-1	240000	260000	8%	2800000	3000000	7%
12-Feb-88	EWG4D/1	440000	470000	7%	3000000	3400000	13%
13-Feb-88	VMWG3S/1	560000	580000	4%	6300000	6500000	3%
14-Feb-88	EWG4D/1	230000	240000	4%	3100000	3100000	0%
15-Feb-88	EWG2S/1	ND	ND	NC	680000	720000	6%
16-Feb-88	VMWG1S/1	ND	ND	NC	91000	100000	9%
18-Feb-88	EWG3D/1	96000	100000	4%	1000000	1100000	10%
19-Feb-88	VMWG2S/1	ND	ND	NC	180000	170000	6%
	VMWG4D/1	ND	ND	NC	61000	51000	NC
20-Feb-88	EWG1S/1	ND	ND	NC	350000	360000	3%
21-Feb-88	VMWG1D/1	ND	ND	NC	ND	29000	NC
22-Feb-88	PGSEPIN	37000	37000	NC	930000	930000	0%
23-Feb-88	VMWG2D/1	ND	ND	NC	210000	180000	15%
24-Feb-88	EWG2D/1	40000	53000	NC	86000	110000	24%
	EWG3S/1	41000	43000	NC	2400000	2500000	4%
25-Feb-88	VMWG3D/1	48000	ND	NC	620000	39000	NC
26-Feb-88	EWG1D/1	ND	ND	NC	81000	86000	6%
02-Mar-88	VMWG4S/1	ND	ND	NC	100000	ND	NC
03-Mar-88	EWG1S/1	ND	ND	NC	170000	210000	21%
	EWG4S/1	120000	160000	29%	5700000	7600000	29%
04-Mar-88	VMWG1S/1	ND	ND	NC	ND	ND	NC
	VMWG3S/1	81000	72000	NC	800000	720000	11%
07-Mar-88	EWG1S/1	ND	ND	NC	120000	180000	40%
	EWG3S/1	ND	ND	NC	1300000	1700000	27%
	PGSEPIN	ND	ND	NC	1100000	1100000	0%
08-Mar-88	VMWG1D/1	ND	ND	NC	ND	ND	NC
	VMWG2D/1	ND	ND	NC	160000	150000	6%
09-Mar-88	EWG1S/1	ND	ND	NC	330000	1500000	128%
	EWG2S/1	ND	ND	NC	480000	470000	2%
	EWG4S/1	190000	160000	17%	7800000	7400000	5%
10-Mar-88	VMWG2S/1	ND	ND	NC	110000	86000	24%
	VMWG4D/1	ND	ND	NC	130000	83000	44%
11-Mar-88	EWG2D/1	48000	49000	NC	440000	110000	120%
	EWG3S/1	ND	ND	NC	1100000	1300000	17%
	EWG4D/1	81000	92000	NC	850000	940000	10%
14-Mar-88	VMWG2S/1	ND	ND	NC	450000	380000	17%
15-Mar-88	VMWG4S/1	ND	ND	NC	39000	37000	NC
16-Mar-88	PB3/1	ND	ND	NC	ND	ND	NC
20-Mar-88	EWG1S/1	ND	ND	NC	520000	160000	106%
21-Mar-88	EWG1D/1	ND	ND	NC	70000	67000	4%
	EWG3D/1	62000	59000	NC	630000	570000	10%
22-Mar-88	PGSECOND	ND	ND	NC	ND	ND	NC
25-Mar-88	EWG1S/1	ND	ND	NC	160000	160000	0%
	EWG2S/1	ND	ND	NC	200000	210000	5%
	EWG4S/1	160000	160000	0%	6600000	6400000	3%
28-Mar-88	PGCARBOUT	70000	70000	NC	110000	110000	0%
29-Mar-88	EWG4S/1	160000	140000	13%	7300000	6200000	16%
30-Mar-88	VMWG1D/1	ND	ND	NC	ND	ND	NC
	VMWG2D/1	ND	ND	NC	240000	240000	0%
01-Apr-88	PGCARBOUT	ND	ND	NC	ND	ND	NC
02-Apr-88	EWG2S/1	ND	ND	NC	170000	110000	43%
06-Apr-88	VMWG3D/1	ND	ND	NC	250000	250000	0%
	VMWG4S/1	ND	ND	NC	ND	ND	NC
08-Apr-88	VMWG2S/1	ND	ND	NC	110000	110000	0%
	VMWG4D/1	ND	ND	NC	48000	ND	NC
11-Apr-88	EWG4D/1	120000	150000	22%	660000	800000	19%
11-Apr-88	PGCARBOUT	89000	86000	NC	480000	450000	6%
12-Apr-88	VMWG3D/1	ND	ND	NC	79000	74000	7%
	VMWG3S/1	ND	ND	NC	110000	97000	13%
	VMWG4D/1	ND	ND	NC	ND	ND	NC
14-Apr-88	VMWG1D/1	ND	ND	NC	ND	71000	NC
	VMWG1S/1	ND	ND	NC	ND	ND	NC

TABLE 4-8. PRECISION RESULTS OF ON-SITE DUPLICATE SAMPLE COLLECTION AND ANALYSIS (GC/FID)
(ug/cubic meter)

Sampling Date	Sample ID	t-1,2-Dichloroethylene (DCE)		Relative Percent Difference	Trichloroeloroethylene (TCE)		Relative Percent Difference
		Original	Duplicate		Original	Duplicate	
15-Apr-88	VMWG2D/1	ND	ND	NC	310000	310000	0%
	VMWG4S/1	ND	ND	NC	ND	ND	NC
	EWG1D/1	ND	ND	NC	40000	120000	NC
	EWG2D/1	ND	ND	NC	80000	85000	6%
	EWG3S/1	ND	ND	NC	610000	580000	5%
	EWG4S/1	130000	130000	0%	4900000	5100000	4%
21-Apr-88	VMWG2S/1	ND	ND	NC	320000	290000	10%
22-Apr-88	PB12/1	ND	ND	NC	ND	ND	NC

Average RPD = 8.1 +/- 8.2

Average RPD = 9.8 +/- 11.0
for n = 53
Average RPD = 16 +/- 27
for n = 56

Note: ND = "Not Detected", i.e., less than the quantitation limit.
Quantitation limits: DCE - 45,000 ug/cubic-meter, TCE - 30,000 ug/cubic-meter.

NC = "Not Calculated".
Precision values are calculated only for concentration values more than twice the quantitation limit.

TABLE 4-9. LCS PERCENT RECOVERY - GC/FID
(Linear Regression with Zero Intercept)

Sampling Date	Sample ID	% Recovery MC	 DCE	 TCE
16-Dec-87	LCS 8-15-1	83	88	71
17-Dec-87	LCS 8-15-1	90	91	92
	CC 7-17-1	108	112	129
18-Dec-87	CC 7-17-1	110	112	114
19-Dec-87	CC 7-15-1	73	84	78
07-Jan-88	LCS 1-5-1	70	73	62
	LCS 1-7-1	90	91	88
	LCS 1-7-1	93	95	96
08-Jan-88	LCS 1-7-1	88	91	85
	LCS 1-7-1	85	86	96
11-Jan-88	LCS 1-11-1	90	91	92
	LCS 1-11-1	87	91	88
	LCS 1-11-1	85	86	85
12-Jan-88	LCS 1-11-1	82	82	77
	LCS 1-11-1	82	82	88
13-Jan-88	LCS 1-13-1	60	64	69
	LCS 1-13-1	102	159 x	292 x
	LCS 1-13-1	118	200 x	319 x
14-Jan-88	LCS 1-14-1b	77	82	85
15-Jan-88	LCS 1-14-1b	67	68	65
	LCS 2-15-1	32 x	88	85
08-Feb-88	LCS 1-8-1	97	100	108
11-Feb-88	LCS 1-11-1	95	95	88
	LCS 1-11-1	95	100	100
12-Feb-88	LCS 1-11-1	90	95	92
	LCS 1-11-1	87	91	85
13-Feb-88	LCS 1-13-1	107	109	123
	LCS 3-13-1	102	105	115
	LCS 1-13-1	95	100	100
14-Feb-88	LCS 3-13-1	88	91	88
	LCS 3-13-1	88	91	88
15-Feb-88	LCS 3-13-1	82	82	77
	LCS 3-13-1	80	82	77
16-Feb-88	LCS 3-13-1	73	77	65
	LCS 6-16-1	105	109	119
	LCS 3-13-1	73	73	65
17-Feb-88	LCS 6-16-1	100	100	104
	LCS 6-16-1	107	109	119
18-Feb-88	LCS 6-16-1	100	100	108
	LCS 1-18-1	87	91	100
	LCS 1-18-1	87	91	108
19-Feb-88	LCS 1-18-1	83	87	92
	LCS 1-18-1	83	89	100
20-Feb-88	LCS 2-20-1	37 x	91	100
21-Feb-88	LCS 1-21-1	93	91	115
	LCS 1-21-1	87	91	108
	LCS 1-21-1	87	89	100
22-Feb-88	LCS 1-21-1	80	84	92
	LCS 1-21-1	77	82	85
23-Feb-88	LCS 1-21-1	70	75	72
	LCS 3-23-1	83	88	108
24-Feb-88	LCS 3-23-1	77	82	92
	LCS 3-23-1	77	84	100
25-Feb-88	LCS 2-25-1	63	65	85
	LCS 2-25-1	63	70	92
26-Feb-88	LCS 2-25-1	70	77	92
	LCS 2-25-1	67	75	92
29-Feb-88	LCS 3-19-1	70	74	108
	LCS 3-19-1	70	74	108
01-Mar-88	LCS 3-19-1	63	65	85
	LCS 1-1-1	70	74	115
	LCS 1-1-1	70	76	123
02-Mar-88	LCS 1-1-1	63	69	100
	LCS 1-1-1	67	71	108
03-Mar-88	LCS 7-3-1	83	89	92

TABLE 4-9. LCS PERCENT RECOVERY - GC/FID
(Linear Regression with Zero Intercept)

Sampling Date	Sample ID	% Recovery			
		MC	DCE	TCE	
	LCS 7-3-1	87	91	92	
04-Mar-88	LCS 7-3-1	100	109	108	
	LCS 7-3-1	100	109	108	
05-Mar-88	LCS 2-5-1	103	109	108	
	LCS 2-5-1	103	109	108	
06-Mar-88	LCS 1-6-1	100	109	92	
	LCS 1-6-1	107	118	108	
07-Mar-88	LCS 1-6-1	103	109	100	
	LCS 1-6-1	103	109	100	
08-Mar-88	LCS 1-8-1	117	127	115	
	LCS 1-8-1	113	118	108	
	LCS 1-8-1	110	118	115	
09-Mar-88	LCS 1-8-1	97	100	92	
	LCS 1-8-1	93	100	100	
10-Mar-88	LCS 1-10-1	103	109	108	
	LCS 1-10-1	103	109	108	
11-Mar-88	LCS 1-10-1	93	100	85	
14-Mar-88	LCS 2-14-1	110	118	115	
15-Mar-88	LCS 2-14-1	100	109	92	
16-Mar-88	LCS 2-16-1	100	109	100	
	LCS 2-16-1	87	100	92	
17-Mar-88	LCS 1-17-1	113	118	115	
18-Mar-88	LCS 2-18-1	110	118	115	
19-Mar-88	LCS 2-18-1	107	118	108	
	LCS 2-18-1	107	109	108	
20-Mar-88	LCS 2-18-1	97	100	92	
	LCS 2-18-1	97	100	92	
21-Mar-88	LCS 1-21-1	113	118	115	
	LCS 1-21-1	110	118	115	
22-Mar-88	LCS 1-21-1	93	100	92	
	LCS 1-21-1	87	91	85	
23-Mar-88	LCS 1-23-1	107	118	108	
	LCS 1-23-1	93	100	100	
24-Mar-88	LCS 1-24-1	113	127	131	
	LCS 1-24-1	113	127	123	
25-Mar-88	LCS 1-24-1	103	109	108	
27-Mar-88	LCS 2-27-1	97	100	108	
28-Mar-88	LCS 2-27-1	97	100	92	
	LCS 2-27-1	100	109	108	
29-Mar-88	LCS 3-29-1	113	118	131	
	LCS 3-29-1	117	127	138	
30-Mar-88	LCS 3-29-1	110	118	123	
	LCS 3-29-1	113	118	123	
31-Mar-88	LCS 1-31-1	113	118	146	
	LCS 1-31-1	110	118	138	
	LCS 1-31-2	107	118	131	
	LCS 1-31-1	100	109	123	
01-Apr-88	LCS 2-1-1	107	118	138	
04-Apr-88	LCS 2-4-1	113	127	162	x
	LCS 2-4-1	110	118	154	x
05-Apr-88	LCS 2-4-1	107	118	146	
	LCS 2-5-1	113	118	108	
	LCS 2-5-1	113	118	108	
06-Apr-88	LCS 2-5-1	103	109	92	
	LCS 2-5-1	103	109	92	
07-Apr-88	LCS 2-5-1	93	100	77	
	LCS 3-7-1	120	118	115	
	LCS 3-7-1	113	118	115	
08-Apr-88	LCS 3-7-1	97	100	85	
09-Apr-88	LCS 2-9-1	127	127	131	
	LCS 2-9-1	120	127	123	
10-Apr-88	LCS 2-9-1	110	118	108	
	LCS 3-10-1	123	127	115	
11-Apr-88	LCS 3-10-1	93	100	85	
	LCS 4-11-1	133	136	138	

TABLE 4-9. LCS PERCENT RECOVERY - GC/FID
(Linear Regression with Zero Intercept)

Sampling Date	Sample ID	% Recovery MC	% Recovery DCE	% Recovery TCE
12-Apr-88	LCS 1-12-1	113	118	108
	LCS 1-12-1	113	118	108
13-Apr-88	LCS 1-12-1	90	91	77
	LCS 2-13-1	93	91	92
	LCS 2-13-1	103	109	108
14-Apr-88	LCS 2-14-1	110	118	108
	LCS 2-14-1	110	118	108
15-Apr-88	LCS 2-15-1	120	118	115
	LCS 2-15-1	120	127	123
18-Apr-88	LCS 2-18-1	117	118	115
	LCS 2-18-1	113	118	108
19-Apr-88	LCS 2-18-1	113	118	108
20-Apr-88	LCS 2-20-1	117	118	115
	LCS 2-20-1	110	118	108
21-Apr-88	LCS 2-21-1	127	136	123
	LCS 2-21-1	127	127	123
	LCS 2-21-1	117	118	108
22-Apr-88	LCS 2-21-1	100	109	85
	LCS 2-22-1	110	118	108
	LCS 2-22-1	107	109	108
	Average % Recovery =	96 +/- 18	103 +/- 19	106 +/- 29

Data Quality Objective is 100% +- 50%

TABLE 4-10. PRECISION RESULTS OF ON-SITE REPLICATE SAMPLE INJECTION AND ANALYSIS (GC/ECD)
(ug/cubic meter)

Sampling Date	Sample ID	1,1,1-Trichloroethane (TRI)		Relative Percent Difference	Tetrachloroethylene (PCE)		Relative Percent Difference	Dilution Factor
		Original	Duplicate		Original	Duplicate		
16-Dec-87	BKG 1 CARB	ND	ND	NC	ND	ND	NC	X 1
	PB-10	ND	ND	NC	ND	ND	NC	X 100
18-Dec-87	EWG3S-1	230000	230000	0%	15000	18000	NC	X 200
08-Jan-88	EWG1S-3	170000	170000	0%	41000	41000	0%	X 200
11-Jan-88	EWG3S-1	83000	80000	4%	16000	16000	0%	X 100
	EWG4D-1	110000	110000	0%	92000	90000	2%	X 200
	VMWG3S-1	150000	150000	0%	19000	20000	5%	X 100
12-Jan-88	EWG1D-2	11000	11000	0%	4000	3400	NC	X 100
	EWG2S-1	7700	7700	0%	4600	4500	NC	X 100
	EWG4D-1	55000	54000	2%	40000	38000	5%	X 100
	VMWG1D-1	1300	1300	NC	ND	ND	NC	X 50
13-Jan-88	EWG1D-2	3600	3600	0%	ND	ND	NC	X 50
	EWG2D-1	6500	6500	0%	7700	7600	1%	X 50
	VMWG2S-1	15000	16000	6%	11000	11000	NC	X 100
15-Jan-88	EWG2S-1	ND	ND	NC	ND	ND	NC	X 100
	VMWG1S-1	2100	2500	NC	11000	4200	NC	X 100
	VMWG2D-1	37000	36000	3%	9300	8000	NC	X 100
11-Feb-88	EWG1S/2	7800	7100	NC	ND	ND	NC	X 200
	EWG3S/1	59000	59000	0%	8700	8400	NC	X 333
	VMWG1D/1	360	670	60%	120	360	100%	X 1
	VMWG4D/1	160000	150000	6%	62000	60000	3%	X 200
	VMWG4S/1	280	190	38%	570	430	28%	X 1
12-Feb-88	EWG2D/1	ND	ND	NC	3500	3200	NC	X 100
	VMWG2S/1	ND	ND	NC	2500	2700	NC	X 100
	VMWG3D/1	18000	19000	5%	ND	ND	NC	X 200
13-Feb-88	EWG1D/1	ND	ND	NC	ND	ND	NC	X 100
	EWG4D/1	47000	45000	4%	14000	13000	NC	X 200
	VMWG4D/1	92	75	20%	76	57	NC	X 1
14-Feb-88	EWG3D/1	21000	21000	0%	13000	12000	NC	X 200
	VMWG4D/1	ND	ND	NC	ND	ND	NC	X 100
15-Feb-88	EWG1D/1	ND	ND	NC	ND	ND	NC	X 100
	EWG4D/1	17000	17000	0%	9900	9400	NC	X 200
	PGSEPIN	7000	7000	NC	ND	ND	NC	X 200
	VMWG3D/1	25000	24000	4%	ND	ND	NC	X 200
16-Feb-88	EWG1D/2	ND	ND	NC	ND	ND	NC	X 50
	EWG3S/1	11000	11000	0%	8800	9000	NC	X 200
	VMWG3S/1	14000	14000	0%	30000	29000	3%	X 100
17-Feb-88	EWG1D/2	ND	ND	NC	ND	ND	NC	X 50
	EWG3D/1	7300	7100	3%	13000	13000	0%	X 50
	VMWG2D/1	1800	1200	40%	760	580	27%	X 5
	VMWG2S/1	460	ND	NC	1300	850	NC	X 25
	VMWG4D/1	52	58	11%	320	350	9%	X 1
18-Feb-88	EWG2D/1	390	390	NC	1700	1800	NC	X 25
	EWG4D/1	9800	9800	0%	13000	14000	7%	X 50
19-Feb-88	PGCARBOUT	ND	ND	NC	26	ND	NC	X 1
	VMWG4S/1	96	98	2%	490	440	11%	X 1
20-Feb-88	EWG2S/1	770	660	NC	1800	1100	NC	X 25
22-Feb-88	EWG3S/1	7500	7500	0%	9000	8800	2%	X 25
23-Feb-88	EWG1D/1	740	740	0%	520	520	0%	X 1
	VMWG3D/1	17000	17000	0%	2500	3400	NC	X 50
24-Feb-88	PGCARBOUT	440	410	7%	ND	ND	NC	X 1
25-Feb-88	VMWG2D/1	1100	1100	NC	ND	ND	NC	X 25
	VMWG4S/1	ND	ND	NC	ND	ND	NC	X 100
26-Feb-88	EWG3D/1	1100	1100	NC	3000	2600	NC	X 50
	EWG4S/1	13000	14000	7%	15000	17000	NC	X 200
	PGCARBOUT	350	ND	NC	ND	ND	NC	X 1
29-Feb-88	VMWG1D/1	73	83	13%	430	540	23%	X 1
	VMWG4S/1	73	79	8%	580	590	2%	X 1
01-Mar-88	PGSECOND	ND	ND	NC	ND	ND	NC	X 1
02-Mar-88	VMWG3D/1	23000	22000	4%	12000	11000	9%	X 25
03-Mar-88	EWG2S/1	430	390	NC	ND	5600	NC	X 20
04-Mar-88	VMWG2S/1	540	560	4%	2000	2400	18%	X 10
05-Mar-88	EWG2D/1	ND	ND	NC	ND	640	NC	X 20
	EWG4S/1	9600	10000	4%	12000	17000	NC	X 200
06-Mar-88	VMWG2S/1	860	860	0%	1000	1500	40%	X 5
	VMWG4D/1	150	150	0%	680	680	0%	X 1
07-Mar-88	EWG2D/1	ND	ND	NC	ND	ND	NC	X 50

TABLE 4-10. PRECISION RESULTS OF ON-SITE REPLICATE SAMPLE INJECTION AND ANALYSIS (GC/ECD)
(ug/cubic meter)

Sampling Date	Sample ID	1,1,1-Trichloroethane (TRI)		Relative Percent Difference	Tetrachloroethylene (PCE)		Relative Percent Difference	Dilution Factor
		Original	Duplicate		Original	Duplicate		
08-Mar-88	EWG1S/1	390	390	0%	1900	2200	15%	X 5
	VMWG1S/1	54	64	17%	330	400	19%	X 1
	VMWG3S/1	3400	3500	3%	11000	12000	9%	X 25
09-Mar-88	EWG3S/1	2000	2000	NC	14000	13000	7%	X 50
09-Mar-88	PGSECOND	ND	ND	NC	ND	ND	NC	X 1
10-Mar-88	VMWG2D/1	1200	1200	0%	510	830	NC	X 5
	VMWG3S/1	2800	2900	4%	4800	5600	15%	X 25
	VMWG4S/1	ND	ND	NC	230	300	NC	X 5
11-Mar-88	EWG2S/1	480	400	NC	4600	5300	14%	X 10
	EWG4S/1	14000	14000	0%	26000	24000	8%	X 200
15-Mar-88	VMWG4D/1	200	200	0%	340	360	6%	X 1
16-Mar-88	PB4/1	ND	ND	NC	3700	5000	NC	X 100
	PB8/1	ND	ND	NC	ND	ND	NC	X 200
17-Mar-88	PB11/1	2600	2700	4%	4700	5800	21%	X 10
18-Mar-88	EWG3S/1	2700	1800	NC	23000	14000	49%	X 50
	VMWG1S/1	ND	ND	NC	ND	ND	NC	X 50
	VMWG4S/1	30	32	NC	430	440	2%	X 1
19-Mar-88	EWG2S/1	450	470	4%	3500	4300	21%	X 10
	EWG4S/1	21000	21000	0%	48000	51000	6%	X 200
20-Mar-88	VMWG2D/1	2200	2200	0%	1700	2800	49%	X 10
	VMWG4D/1	ND	ND	NC	280	710	NC	X 5
21-Mar-88	EWG3S/1	1200	1200	NC	9400	9900	5%	X 50
	FB	ND	ND	NC	46	75	NC	X 1
	PGSEPIN	1200	1200	0%	2800	2700	NC	X 25
22-Mar-88	VMWG1S/1	ND	ND	NC	190	220	15%	X 1
23-Mar-88	EWG2D/1	350	330	6%	1800	2100	15%	X 5
24-Mar-88	VMWG1S/1	ND	ND	NC	680	680	NC	X 10
	VMWG3S/1	3400	3400	0%	3900	4300	10%	X 25
25-Mar-88	EWG3S/1	1000	990	NC	10000	8500	16%	X 25
26-Mar-88	VMWG1D/1	ND	ND	NC	170	210	NC	X 5
	VMWG2D/1	2300	2300	0%	1800	2500	33%	X 10
27-Mar-88	EWG3S/1	2300	2000	NC	21000	19000	10%	X 50
	EWG4S/1	16000	16000	0%	54000	52000	4%	X 200
28-Mar-88	EWG1D/1	290	280	4%	380	360	5%	X 1
	VMWG2D/1	1800	1900	5%	1700	2800	49%	X 10
29-Mar-88	EWG2D/1	310	290	7%	1200	1200	0%	X 5
	EWG3D/1	1800	1900	5%	7300	7800	7%	X 25
30-Mar-88	EWG1D/1	500	450	11%	580	580	0%	X 1
	VMWG2S/1	270	310	14%	690	920	29%	X 5
30-Mar-88	VMWG3D/1	17000	17000	0%	7700	7500	3%	X 25
31-Mar-88	EWG3S/1	1200	1400	NC	10000	9800	2%	X 33
	EWG4D/1	5700	5700	0%	14000	14000	0%	X 25
01-Apr-88	VMWG1S/1	ND	53	NC	180	210	15%	X 1
	VMWG2S/1	490	460	6%	500	460	NC	X 5
02-Apr-88	EWG4D/1	4700	4800	2%	13000	13000	0%	X 100
04-Apr-88	VMWG1D/1	140	ND	NC	310	230	NC	X 5
	VMWG3D/1	16000	16000	0%	6100	5100	18%	X 25
05-Apr-88	EWG3S/1	1400	1400	0%	13000	13000	0%	X 25
	EWG4S/1	13000	13000	0%	31000	30000	3%	X 200
06-Apr-88	VMWG2S/1	890	890	0%	470	550	NC	X 5
	VMWG4D/1	ND	ND	NC	440	580	NC	X 10
07-Apr-88	EWG3S/1	890	940	NC	7900	7500	5%	X 25
	PGSEPIN/1	1200	1100	NC	3100	3000	3%	X 25
08-Apr-88	VMWG1S/1	ND	ND	NC	160	310	NC	X 5
	VMWG3S/1	3000	3000	0%	10000	9800	2%	X 25
09-Apr-88	EWG1D/1	180	180	NC	280	350	NC	X 5
	EWG3S/1	540	540	NC	6700	6800	1%	X 25
10-Apr-88	VMWG1D/1	ND	ND	NC	ND	ND	NC	X 10
	VMWG4D/1	ND	ND	NC	21	36	NC	X 1
11-Apr-88	EWG1D/1	200	180	NC	370	340	NC	X 5
	EWG3S/1	ND	450	NC	3100	3100	0%	X 25
13-Apr-88	EWG4S/1	13000	8800	NC	11000	11000	NC	X 200
	PGCARBOUT	5400	5400	0%	63	55	NC	X 5
20-Apr-88	PB10/1	ND	ND	NC	ND	ND	NC	X 10
	PB5/1	1500	2300	42%	ND	ND	NC	X 1
21-Apr-88	FBB/1	330	500	41%	ND	ND	NC	X 1
22-Apr-88	VMWG4S/1	430	430	NC	1100	1400	NC	X 20

TABLE 4-10. PRECISION RESULTS OF ON-SITE REPLICATE SAMPLE INJECTION AND ANALYSIS (GC/ECD)
(ug/cubic meter)

Sampling Date	Sample ID	1,1,1-Trichloroethane (TRI)		Relative Percent Difference	Tetrachloroethylene (PCE)		Relative Percent Difference	Dilution Factor
		Original	Duplicate		Original	Duplicate		
			Average RPD =	5.8 +/- 11.4		Average RPD =	12.3 +/- 16.7	

Note: ND = "Not Detected", i.e., less than the quantitation limit.
Quantitation limits: TRI - 22 ug/cubic-meter times dilution factor,
PCE - 55 ug/cubic-meter times dilution factor.

NC = "Not Calculated".
Precision values are calculated only for reported concentrations more than twice the quantitation limit.

is 6 relative percent difference. Of the 134 samples analyzed for PCE, 65 sample concentrations are high enough to provide an estimate of precision. Of the available 65 PCE precision estimates, 64 (98 percent) are within the QA objective. The average precision for these 65 PCE precision values is 12 relative percent difference.

A total of 62 samples (Table 4-11) were sampled in duplicate and analyzed. These analyses provide an estimate of the sampling and analytical precision. Of the 62 samples analyzed for TRI, 38 sample concentrations are high enough to provide an estimate of precision. Of the available 38 TRI precision estimates, 37 (97 percent) are within the QA objective. The average precision for these 38 TRI precision values is 12 relative percent difference. Of the available 33 PCE precision values, 32 (97 percent) are within the QA objective. The average precision for these 33 PCE precision values is 19 relative percent difference.

Analytical accuracy for MC, TRI, and PCE has been estimated through the analysis of 170 laboratory control samples (Table 4-12). The QA objective is 100 plus-or-minus 50 percent recovery of these compounds spiked into nitrogen. Of the 170 recovery values for MC, 168 (99 percent) met the QA objective. For TRI, 163 values (96 percent) met the QA objective. For PCE, 127 values (75 percent) met the QA objectives.

Precision and accuracy completeness values for GC/ECD onsite analyses ranged from 75 percent to 100 percent which does not meet the QA completeness objective of 90 percent for all parameters. All parameters except PCE recovery do meet the completeness objective.

Failure to meet PCE completeness goals for accuracy is thought to be due to the use of a linear calibration curve during most of the program. A detailed assessment of PCE calibration data at the end of the program indicated that the PCE calibration curve is decidedly non-linear and that a quadratic calibration curve is required to adequately represent the data. All PCE concentrations provided in this report have been calculated with a quadratic calibration curve. Unfortunately, LCS recoveries which had appeared to be within limits during a linear calibration curve frequently proved to have been just outside the QA objective when recalculated with a quadratic curve after the completion of the field program. If recovery objectives for PCE were reset to 40 to 200 percent recovery, the observed recoveries would be 93 percent complete.

TABLE 4-11. PRECISION RESULTS OF ON-SITE DUPLICATE SAMPLING AND ANALYSIS (GC/ECD)
(ug/cubic meter)

Sampling Date	Sample ID	1,1,1-Trichloroethane (TRI) Original	1,1,1-Trichloroethane (TRI) Duplicate	Relative Percent Difference	Tetrachloroethylene (PCE) Original	Tetrachloroethylene (PCE) Duplicate	Relative Percent Difference	Dilution Factor
18-Dec-87	VMWG2D-1	120000	110000	9%	10000	6000	NC	X 200
19-Dec-87	EWG3S-7	200000	230000	14%	11000	14000	NC	X 200
07-Jan-88	EWG2D-3	61000	60000	2%	14000	12000	15%	X 100
	EWG3D-5	63000	62000	2%	18000	17000	6%	X 100
09-Jan-88	VMWG3S-1	150000	150000	0%	12000	14000	15%	X 100
12-Jan-88	VMWG2S-1	9000	17000	62%	8000	16000	NC	X 100
15-Jan-88	EWG1S-1	26000	30000	14%	12000	15000	22%	X 100
12-Feb-88	EWG4D/1	52000	53000	2%	18000	23000	NC	X 200
13-Feb-88	VMWG3S/1	54000	52000	4%	22000	22000	NC	X 200
14-Feb-88	EWG4D/1	38000	30000	24%	29000	23000	23%	X 100
15-Feb-88	EWG2S/1	2200	2300	NC	1300	1700	NC	X 50
16-Feb-88	VMWG1S/1	ND	ND	NC	ND	ND	NC	X 50
18-Feb-88	EWG3D/1	3600	3600	0%	8800	9300	6%	X 50
19-Feb-88	VMWG2S/1	ND	ND	NC	1700	1800	NC	X 67
	VMWG4D/1	110	120	9%	590	390	41%	X 1
21-Feb-88	VMWG1D/1	24	27	NC	100	160	NC	X 1
22-Feb-88	PGSEPIN	2300	2200	NC	3000	3800	NC	X 50
23-Feb-88	PGCARBOUT	25	24	NC	24	ND	NC	X 1
	VMWG2D/1	970	1000	NC	ND	ND	NC	X 25
24-Feb-88	EWG2D/1	320	500	44%	1700	2300	30%	X 5
	EWG3S/1	4100	4400	7%	11000	12000	9%	X 50
26-Feb-88	EWG1D/1	480	510	6%	220	330	NC	X 5
02-Mar-88	VMWG4S/1	240	310	25%	1500	2200	38%	X 5
03-Mar-88	EWG1S/1	340	270	NC	790	460	NC	X 10
	EWG4S/1	28000	30000	7%	60000	73000	20%	X 200
04-Mar-88	VMWG1S/1	120	24	NC	110	280	NC	X 1
	VMWG3S/1	3200	2400	29%	3800	3200	17%	X 50
07-Mar-88	EWG1S/1	400	350	NC	2000	2000	0%	X 10
07-Mar-88	EWG3S/1	1500	2200	NC	7500	11000	38%	X 50
	PGSEPIN/1	1800	1800	NC	4500	4300	NC	X 50
08-Mar-88	VMWG1D/1	30	ND	NC	67	33	NC	X 1
	VMWG2D/1	1300	1200	8%	600	600	0%	X 5
09-Mar-88	EWG1S/1	470	450	4%	2600	3000	14%	X 10
	EWG2S/1	290	320	NC	2200	3500	46%	X 10
	EWG4S/1	15000	13000	14%	25000	23000	8%	X 200
10-Mar-88	VMWG2S/1	500	420	17%	610	670	9%	X 1
11-Mar-88	EWG2D/1	660	410	NC	4700	3900	19%	X 10
	EWG3S/1	1200	1200	NC	7000	8900	24%	X 33
	EWG4D/1	2600	3800	38%	11000	15000	31%	X 25
14-Mar-88	VMWG2S/1	4300	4500	5%	2800	3100	10%	X 10
15-Mar-88	VMWG4S/1	180	200	11%	650	700	7%	X 1
16-Mar-88	PB3/1	ND	ND	NC	ND	ND	NC	X 100
20-Mar-88	EWG1S/1	710	750	5%	3800	2900	27%	X 10
21-Mar-88	EWG3D/1	2000	2200	10%	6100	5800	5%	X 25
25-Mar-88	EWG1S/1	580	520	11%	2500	2300	8%	X 5
	EWG2S/1	330	330	0%	2700	2700	0%	X 5
	EWG4S/1	13000	12000	8%	40000	32000	22%	X 200
28-Mar-88	PGCARBOUT	2800	3100	10%	190	170	NC	X 5
29-Mar-88	EWG4S/1	11000	9900	11%	35000	29000	19%	X 200
30-Mar-88	VMWG1D/1	ND	ND	NC	330	210	44%	X 1
	VMWG2D/1	1300	1400	7%	1300	1600	21%	X 10
01-Apr-88	PGCARBOUT	24	26	NC	26	29	NC	X 1
02-Apr-88	EWG2S/1	ND	ND	NC	1200	1400	NC	X 25
06-Apr-88	VMWG3D/1	430	2500	NC	450	3800	NC	X 10
	VMWG4S/1	ND	ND	NC	340	290	NC	X 10
08-Apr-88	VMWG2S/1	520	460	12%	680	480	NC	X 5
	VMWG4D/1	ND	ND	NC	370	210	NC	X 5
11-Apr-88	EWG4D/1	3700	4300	15%	7200	9700	30%	X 25
	PGCARBOUT	5600	6500	15%	220	ND	NC	X 10
12-Apr-88	VMWG3S/1	690	700	1%	670	470	NC	X 5
21-Apr-88	VMWG2S/1	3800	3700	3%	190	1200	NC	X 10
22-Apr-88	PB12/1	32	48	NC	ND	ND	NC	X 1
		Average RPD =		12.2 +/- 12.9	Average RPD =		19 +/- 13	

TABLE 4-11. PRECISION RESULTS OF ON-SITE DUPLICATE SAMPLING AND ANALYSIS (GC/ECD)
(ug/cubic meter)

Sampling Date	Sample ID	1,1,1-Trichloroethane (TRI)		Relative Percent Difference	Tetrachloroethylene (PCE)		Relative Percent Difference	Dilution Factor
		Original	Duplicate		Original	Duplicate		

Note: ND = "Not Detected", i.e., less than the quantitation limit.
Quantitation limits: TRI - 22 ug/cubic-meter times dilution factor,
PCE - 55 ug/cubic-meter times dilution factor.

NC = "Not Calculated".
Precision values are calculated only for reported concentrations more than twice the quantitation limit.

TABLE 4-12. LCS PERCENT RECOVERY - GC/ECD
(Quadratic Regression with Zero Intercept)

Sampling Date	Sample ID	% Recovery		
		MC	TRI	PCE
11-Dec-87	CC 5-10-1	90	78	147
	1-11-1	107	91	99
	2-11-1	98	102	100
14-Dec-87	CC 1-14-1	95	93	96
15-Dec-87	LCS 5-15-1	91	82	269 x
16-Dec-87	CC 5-16-1	131	135	121
	LCS 2-16-1	92	82	148
17-Dec-87	LCS 6-17-1	88	164 x	165 x
18-Dec-87	LCS 6-17-1 L	68	143	104
19-Dec-87	LCS 6-17-1 L	68	129	65
20-Dec-87	CC 1-19-1	91	100	65
	1-20-1	99	108	137
07-Jan-88	LCS 2-07-1	88	95	138
	LCS 2-07-1	89	99	133
	LCS 3-07-1	93	81	81
	LCS 3-07-1	89	87	76
08-Jan-88	LCS 3-07-1	85	81	65
	LCS 3-07-1	86	86	212 x
09-Jan-88	LCS 5-09-1	97	96	113
10-Jan-88	LCS 1-10-1	94	86	53
11-Jan-88	LCS 5-09-1	88	86	71
	LCS 2-11-1	103	96	45 x
12-Jan-88	LCS 1-12-1	93	90	50
	LCS 1-12-1	94	90	65
13-Jan-88	LCS 1-13-1	72	90	127
	LCS 2-13-1	90	107	106
14-Jan-88	LCS 1-14-1	74	102	97
	LCS 2-13-1	77	104	98
	LCS 1-15-1	87	105	107
	LCS 1-15-1	84	95	68
15-Jan-88	LCS 1-15-1	86	99	85
	LCS 3-15-1	72	139	103
09-Feb-88	LCS 1-9-1	43 x	45 x	120
	LCS 1-9-1	41 x	47 x	126
11-Feb-88	LCS 3-11-1	87	102	150
	LCS 3-11-1	81	106	150
	LCS 3-11-1	80	123	111
	LCS 3-11-1	81	127	107
12-Feb-88	LCS 1-12-1	74	107	85
	LCS 1-12-1	73	120	57
	LCS 1-12-1	68	110	55
	LCS 1-12-1	76	128	59
14-Feb-88	LCS 2-14-1	88	162 x	150
	LCS 2-14-1	78	157 x	115
15-Feb-88	LCS 1-15-1	78	146	90
	LCS 1-15-1	78	148	67
16-Feb-88	LCS 5-16-1	102	125	220 x
	LCS 5-16-1	95	120	186 x
	LCS 5-16-2	82	104	101
17-Feb-88	LCS 5-16-2	76	97	96
	LCS 5-16-2	68	89	66
18-Feb-88	LCS 5-16-1	78	102	81
	LCS 5-16-1	80	104	75
19-Feb-88	LCS 5-16-1	75	95	65
	LCS 5-16-1	74	95	64
20-Feb-88	LCS 1-20-1	87	87	104
21-Feb-88	LCS 1-20-1	76	79	164 x
	LCS 1-20-1	75	85	167 x
22-Feb-88	LCS 1-20-1	70	74	167 x
	LCS 3-22-1	99	88	88
23-Feb-88	LCS 1-23-2	98	91	80
	LCS 1-23-2	91	92	61
24-Feb-88	LCS 1-23-2	82	80	50
	LCS 1-23-2	86	84	46 x
25-Feb-88	LCS 4-25-2	80	65	44 x

TABLE 4-12. LCS PERCENT RECOVERY - GC/ECD
(Quadratic Regression with Zero Intercept)

Sampling Date	Sample ID	% Recovery		
		MC	TRI	PCE
	LCS 4-25-2	73	67	36 x
	LCS 4-25-2	70	63	36 x
26-Feb-88	LCS 4-25-2	60	47 x	24 x
	LCS 1-26-2	74	56	26 x
	LCS 1-26-2	71	56	35 x
29-Feb-88	LCS 4-29-1	98	118	168 x
	LCS 4-29-2	116	147	114
	LCS 4-29-2	100	154 x	88
01-Mar-88	LCS 2-1-1	92	127	105
	LCS 2-1-1	97	142	95
	LCS 6-29-1	69	140	141
02-Mar-88	LCS 3-2-1	94	92	57
	LCS 3-2-1	92	100	54
03-Mar-88	LCS 5-3-1	91	92	76
	LCS 5-3-1	85	84	55
	LCS 5-3-1	89	101	79
04-Mar-88	LCS 5-3-1	75	88	59
	LCS 6-4-1	84	83	39 x
	LCS 6-4-1	76	95	61
05-Mar-88	LCS 1-5-1	82	87	92
	LCS 1-5-1	87	94	112
06-Mar-88	LCS 1-5-1	75	77	93
	LCS 2-6-1	85	84	52
07-Mar-88	LCS 2-6-1	83	84	47 x
	LCS 2-6-1	78	94	45 x
08-Mar-88	LCS 2-8-1	100	106	81
	LCS 2-8-1	99	114	107
09-Mar-88	LCS 2-8-1	90	98	106
	LCS 2-8-1	93	111	120
10-Mar-88	LCS 3-10-2	108	119	120
	LCS 3-10-2	105	123	104
11-Mar-88	LCS 3-10-2	98	106	90
	LCS 3-10-2	103	118	114
14-Mar-88	LCS 4-14-1	97	84	119
15-Mar-88	LCS 4-14-1	81	89	95
16-Mar-88	LCS 4-16-1	94	94	128
	LCS 4-16-1	91	106	109
17-Mar-88	LCS 4-16-1	83	89	91
18-Mar-88	LCS 4-16-1	81	92	100
	LCS 4-16-1	72	97	88
19-Mar-88	CC 3-18-1	93	110	133
20-Mar-88	LCS 1-20-1	89	97	148
	LCS 1-20-1	83	99	123
21-Mar-88	LCS 2-21-1	85	88	75
	LCS 2-21-1	91	99	79
22-Mar-88	LCS 2-21-1	82	81	53
	LCS 2-22-1	80	87	64
	LCS 2-21-1	81	93	77
23-Mar-88	LCS 2-23-1	97	103	177 x
	LCS 2-23-1	95	104	133
	LCS 2-23-1	97	115	163 x
24-Mar-88	LCS 2-23-1	72	100	110
	LCS 2-23-1	86	112	114
25-Mar-88	LCS 2-23-1	70	96	101
	LCS 1-25-1	91	101	90
26-Mar-88	LCS 1-25-1	68	97	86
	LCS 1-25-1	68	106	90
27-Mar-88	LCS 4-27-1	90	104	157 x
	LCS 4-27-1	88	106	163 x
28-Mar-88	LCS 4-27-1	78	92	116
	LCS 2-28-1	78	84	90
	LCS 2-28-1	68	86	89
29-Mar-88	LCS 1-29-1	91	106	171 x
	LCS 1-29-1	91	120	204 x
30-Mar-88	LCS 1-29-1	86	104	150

TABLE 4-12. LCS PERCENT RECOVERY - GC/ECD
(Quadratic Regression with Zero Intercept)

Sampling Date	Sample ID	% Recovery MC	% Recovery TRI	% Recovery PCE
	LCS 1-29-1	88	113	155 x
31-Mar-88	LCS 3-31-1	83	118	258 x
	LCS 6-31-1	99	115	72
	LCS 6-31-1	90	121	90
01-Apr-88	LCS 4-1-1	105	121	107
	LCS 4-1-1	92	124	102
02-Apr-88	LCS 4-1-1	87	108	69
	LCS 4-1-1	89	113	69
04-Apr-88	LCS 4-4-1	121	124	216 x
	LCS 4-4-1	106	135	150
05-Apr-88	LCS 4-4-1	90	118	140
	LCS 3-5-1	110	118	166 x
	LCS 3-5-1	97	126	92
06-Apr-88	LCS 1-6-1	109	111	67
06-Apr-88	LCS 1-6-1	107	124	80
07-Apr-88	LCS 1-6-1	97	104	60
	LCS 5-7-1	84	86	67
	LCS 5-7-1	75	95	85
08-Apr-88	LCS 6-8-1	87	95	79
	LCS 7-8-1	95	122	97
09-Apr-88	LCS 4-9-1	119	133	159 x
	LCS 4-9-1	103	140	156 x
10-Apr-88	LCS 4-9-1	79	89	101
	LCS 1-10-1	82	85	75
	LCS 2-10-1	60	113	71
11-Apr-88	LCS 3-11-1	90	107	114
	LCS 3-11-1	89	111	115
13-Apr-88	LCS 6-13-1	98	102	94
	LCS 6-13-1	93	105	92
19-Apr-88	LCS 4-19-1	99	113	150
	LCS 4-19-2	98	111	143
20-Apr-88	LCS 4-19-2	104	106	137
	LCS 3-20-1	91	98	97
	LCS 3-20-1	100	110	144
21-Apr-88	LCS 3-20-1	99	104	150
	LCS 6-21-1	107	121	158 x
	LCS 6-21-1	106	119	150
	LCS 6-21-1	103	119	150
22-Apr-88	LCS 6-21-1	100	106	133
	LCS 6-21-1	106	117	150
	Average % Recovery =	88 +/- 13	103 +/- 21	105 +/- 44

Data Quality Objective is 100% +- 50%

GC/FID Analysis of Activated Carbon--

Sampling and analysis precision for carbon canisters was estimated through the analysis of field-generated duplicate samples. Results of these analyses are presented in Table 4-13. Precision goals were met for all GC/FID analysis of carbon canister samples, resulting in 100 percent completeness.

The accuracy of this analysis was estimated through the preparation and analysis of eleven LCSs, spiked with the five components of interest. As Table 4-14 shows, all analyses were within the QA objective.

GC/MS Analysis of Separator Liquid--

Separator liquid samples were analyzed for volatile organics via purge and trap GC/MS. Accuracy of this analysis was estimated through the use of surrogate standards and LCSs. An LCS was analyzed daily with the samples. Table 4-15 is a summary of the QC data for this analysis, all of which met QA objectives.

GC/MS Purge and Trap Analysis of Soil--

GC/MS analysis of soil samples was performed by purge and trap techniques on a methanol dispersion. Analytical precision and accuracy was estimated via the analysis of matrix-spiked pairs of soil sample methanol dispersions. Table 4-16 summarizes soil matrix spike recovery data from the program. Accuracy estimates were also obtained via the recovery of surrogate-spiked components, provided in Table 4-17. Review of this data indicates 100 percent completeness for both precision and accuracy of the analysis.

Sampling and analytical precision estimates were obtained by analyzing field duplicate soil samples. Table 4-18 summarizes the data obtained from twenty-five pairs of duplicate samples. Only seven values were within the objectives provided in the QAPP, resulting in twenty-eight percent completeness. Comparison of Table 4-18 with Table 4-16 indicates that the poor precision of the former is a consequence of sampling a non-homogeneous matrix. Poor precision was also evident for analysis of pH, TOC and oil and grease and may also be attributed to sampling of a non-homogeneous matrix.

TABLE 4-13. PRECISION OF SAMPLING AND ANALYSIS OF CARBON CANISTERS

Sample ID	Sampling Date	Methylene Chloride			trans-1,2-Dichloro-ethylene			Trichloroethane			Trichloroethylene			Tetrachloroethylene		
		Conc. (mg/Kg)		RPD	Conc. (mg/Kg)		RPD	Conc. (mg/Kg)		RPD	Conc. (mg/Kg)		RPD	Conc. (mg/Kg)		RPD
CARBCAN/1-13/1	14-Jan-88	0.38	0.39	3	ND	ND	NC	0.5	0.4	22	11	9.1	19	ND	ND	NC
CARBCAN/2-16/1	16-Feb-88	ND	ND	NC	ND	ND	NC	ND	ND	NC	21	17	21	ND	ND	NC
CARBCAN/2-25/1	25-Feb-88	ND	ND	NC	ND	ND	NC	ND	ND	NC	33	48	37	0.56	0.76	30
CARBCAN/3-14/1	14-Mar-88	ND	ND	NC	ND	ND	NC	ND	ND	NC	51	55	8	ND	ND	NC
CARBCAN/3-24/1	25-Mar-88	ND	ND	NC	ND	ND	NC	ND	ND	NC	26	27	4	ND	ND	NC
CARBCAN/4-5/1	05-Apr-88	ND	ND	NC	12	12	0	ND	ND	NC	18	17	6	ND	ND	NC
CARBCAN/4-5/1	05-Apr-88	ND	ND	NC	8.4	8.4	0	ND	ND	NC	16	16	0	ND	ND	NC
CARBCAN/4-8/1	08-Apr-88	ND	ND	NC	2.8	2.4	15	ND	ND	NC	110	98	12	ND	ND	NC
CARBCAN/4-11/1	12-Apr-88	ND	ND	NC	2.5	2.2	13	0.27	0.28	4	188	208	10	ND	ND	NC
CARBCAN/1911	14-Apr-88	ND	ND	NC	3.5	3.4	3	0.26	0.28	7	120	120	0	ND	ND	NC
CARBCAN/2088	19-Apr-88	ND	ND	NC	2.8	3.4	19	ND	ND	NC	0.53	0.7	28	ND	ND	NC

ND = Not Detected.

NC = Not Calculated. Precision values are calculated for reported concentrations greater than twice the quantitation limit.

QA objective is +/- 50 % relative percent difference (RPD).

TABLE 4-14. ACCURACY OF ANALYSIS OF CARBON CANISTERS

Sampling Date	Percent Recovery (MC)	(DCE)	(TRI)	(TCE)	(PCE)
1/14/88	98	104	84	77	83
3/14/88	90	90	100	77	73
	118	94	94	82	82
3/25/88	85	89	89	92	92
	79	91	100	91	105
3/30/88	92	94	98	96	96
4/05/88	102	101	99	97	92
4/08/88	90	90	100	77	73
4/12/88	118	94	94	82	82
4/19/88	77	88	88	94	102
	75	82	100	105	110
Average %Rec =	93	92	95	88	90

QA Objective = 50 - 150%

TABLE 4-15. LCS AND SURROGATE RECOVERY FOR ANALYSIS OF SEPARATOR LIQUID

Date	(MC)	(DCE)	(TRI)	(TCE)	(PCE)
1/04/88	104	102	98	105	105
1/28/88	97	89	100	99	90
3/15/88	124	117	96	95	96
3/30/88	102	101	94	92	94
4/12/88	109	106	98	96	94
Average %Rec =	107	103	97	97	96

QA Objective = 50 - 150%

- SURROGATE % RECOVERY -

(AVERAGE)

d4-dichloroethane = 107 +/- 5

d8-Toluene = 99 +/- 2

BFB = 102 +/- 2

QA Objective = 50 - 150%

TABLE 4-16. RESULTS OF ANALYSIS OF SOIL MATRIX SPIKES BY PURGE AND TRAP GC/MS

Percent Recovery														
Methylene Chloride			Trichloroethylene			trans-1,2-Dichloroethylene			Trichloroethane			Tetrachloroethylene		
MS	**MSD**	**RPD**	**MS**	**MSD**	**RPD**	**MS**	**MSD**	**RPD**	**MS**	**MSD**	**RPD**	**MS**	**MSD**	**RPD**
103	105	1.9	100	103	3.0	82	100	19.8	103	108	4.7	82	82	0.0
106	106	0.0	103	103	0.0	97	100	3.0	106	106	0.0	100	103	3.0
85	90	5.7	103	109	5.7	103	109	5.7	109	119	8.8	103	109	5.7
115	115	0.0	105	105	0.0	105	105	0.0	122	127	4.0	105	102	2.9
106	109	2.8	109	109	0.0	103	106	2.9	122	122	0.0	109	109	0.0
97	97	0.0	97	94	3.1	94	94	0.0	92	106	14.1	92	92	0.0
107	104	2.8	104	104	0.0	104	104	0.0	118	114	3.4	100	100	0.0
92	92	0.0	109	109	0.0	105	103	1.9	114	114	0.0	111	108	2.7
98	98	0.0	110	110	0.0	107	104	2.8	121	121	0.0	114	114	0.0
99	99	0.0	115	111	3.5	100	100	0.0	123	121	1.6	109	109	0.0
105	101	3.9	100	89	11.6	100	93	7.3	107	96	10.8	96	86	11.0
112	112	0.0	100	93	7.3	104	100	3.9	107	100	6.8	93	89	4.4
111	115	3.5	96	96	0.0	96	100	4.1	104	104	0.0	89	86	3.4
123	115	6.7	111	103	7.5	102	97	5.0	111	106	4.6	97	89	8.6
121	118	2.5	103	105	1.9	100	100	0.0	114	114	0.0	95	103	8.1
Average														
105	105	2	104	103	3	100	101	4	112	112	4	100	99	3

QA objective for this analysis is +/- 50 % relative percent difference (RPD).

TABLE 4-17. SURROGATE RECOVERY OF PURGE & TRAP ANALYSIS OF SOIL

Pretreatment		Average	+-	Std.Dev.
	d4-Dichloroethane	104	+-	7.0
	d8-Toluene	101	+-	3.7
	BFB	107	+-	10.0

Midtreatment		Average	+-	Std.Dev.
	d4-Dichloroethane	103	+-	6.5
	d8-Toluene	101	+-	3.4
	BFB	112	+-	13.4

Posttreatment		Average	+-	Std.Dev.
	d4-Dichloroethane	105	+-	3.5
	d8-Toluene	102	+-	2.6
	BFB	110	+-	11.5

QA Objective is 50 - 150 %Recovery

TABLE 4-18. PRECISION OF SOIL SAMPLING AND ANALYSIS BY PURGE & TRAP GC/MS

Sample ID	Date Sampled	Methylene Chloride			trans-1,2-Dichloro-ethylene			Trichloroethane			Trichloroethylene			Tetrachloroethylene		
		Conc. (mg/Kg)		RPD	Conc. (mg/Kg)		RPD	Conc. (mg/Kg)		RPD	Conc. (mg/Kg)		RPD	Conc. (mg/Kg)		RPD
MWS1/1	01-Dec-87	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
MWS1/6	01-Dec-87	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
EWS2/8	07-Dec-87	ND	ND	NC	ND	ND	NC	ND	ND	NC	9.54	5.83	48	ND	ND	NC
EWS3/1	08-Dec-87	ND	ND	NC	ND	ND	NC	ND	ND	NC	1.2	2.77	79 *	ND	ND	NC
EWS4/2	09-Dec-87	ND	ND	NC	ND	ND	NC	ND	ND	NC	29.9	91.8	102 *	1.4	8.69	144 *
EWS4/7	09-Dec-87	ND	ND	NC	ND	ND	NC	ND	ND	NC	3.14	17.4	139 *	ND	ND	NC
EWS1/5	10-Dec-87	ND	ND	NC	ND	ND	NC	ND	ND	NC	12.5	4.27	98 *	3.6	1.4	88 *
EWS1/9	10-Dec-87	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
MWS3/3	11-Dec-87	7.5	5	40	1.6	3.93	84 *	ND	ND	NC	80	43.9	58 *	ND	ND	NC
MWS4/6	14-Dec-87	ND	ND	NC	ND	ND	NC	ND	ND	NC	1.3	4.24	106 *	ND	ND	NC
B1/5	15-Mar-88	14	14	0	ND	ND	NC	ND	ND	NC	3	1.5	67 *	ND	ND	NC
B1/11	15-Mar-88	6.4	5	25	ND	ND	NC	ND	ND	NC	ND	1.4	200 *	ND	ND	NC
B2/3	15-Mar-88	ND	ND	NC	5	2.4	70 *	ND	ND	NC	66	30	75 *	3.4	2.4	34 *
B3/3	15-Mar-88	ND	ND	NC	ND	ND	NC	ND	ND	NC	1.5	1.3	14	ND	ND	NC
B4/2	16-Mar-88	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
B6/5	19-Apr-88	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
B6/10	19-Apr-88	ND	ND	NC	ND	ND	NC	ND	ND	NC	5.3	1.9	94 *	ND	ND	NC
B7/6	19-Apr-88	ND	ND	NC	ND	ND	NC	ND	ND	NC	12	13	8	ND	ND	NC
B7/10	19-Apr-88	ND	ND	NC	ND	ND	NC	ND	ND	NC	12	3.1	118 *	ND	ND	NC
B8/6	20-Apr-88	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
B10/4	21-Apr-88	ND	ND	NC	ND	ND	NC	ND	ND	NC	1.3	1.1	17	ND	ND	NC
B10/6	21-Apr-88	ND	ND	NC	ND	ND	NC	ND	ND	NC	1.6	3.7	79 *	1.2	1.8	40
B11/9	22-Apr-88	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
B12/5	22-Apr-88	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
B13/2	25-Apr-88	ND	ND	NC	32	10	105 *	ND	ND	NC	810	98	157 *	ND	ND	NC

ND = Not Detected.

NC = Not Calculated. Precision values are calculated for reported concentrations greater than the quantitation limit.

* = Value is outside QA objective of +/- 50 % relative percent difference (RPD).

GC/MS Analysis of TCLP Leachates--

TCLP leachates were analyzed for volatile organics via purge and trap GC/MS. Precision and accuracy of the analysis is shown from the analysis of matrix-spiked pairs of leachates (Table 4-19). Analytical accuracy was estimated through the analysis of surrogate spikes of each sample. Table 4-20 summarizes surrogate spike recovery. Completeness of 100 percent was obtained for this analysis.

Table 4-21 provides an estimate of the sampling and analysis precision for TCLP leachates. The poor precision obtained can be attributed to sampling a non-homogeneous matrix.

GC/FID Analysis of Soil Headspace--

Accuracy of the GC/FID analysis of soil headspace was estimated via the analysis of LCSs. As shown in Table 4-22, all LCS recoveries are within the QA objectives for this analysis.

Precision of sampling and analysis is provided in Table 4-23. This estimate was obtained by the analysis of field-generated duplicates. Twenty-three duplicate samples were analyzed. Of these, seventeen measurable concentrations were utilized to estimate precision. Seven concentrations were within the QA objective, resulting in 59 percent completeness for this procedure. This poor precision is attributable to the collection of a small sample aliquot (5 grams) from a non-homogeneous matrix.

SITE SELECTION AND SAMPLING PROCEDURES

Site Selection and Sampling Procedures

The location of extraction wells and vacuum monitoring wells were selected by the Terra Vac geologist based on the location of the contaminant plume and site access. All sampling and process measurement ports along the system were installed by Terra Vac. Sampling procedures were conducted as specified in the QA project plan with the following deviations:

TABLE 4-19. RESULTS OF ANALYSIS OF TCLP MATRIX SPIKES BY PURGE & TRAP GC/MS

Percent Recovery														
Methylene Chloride			Trichloroethylene			trans-1,2-Dichloroethylene			Trichloroethane			Tetrachloroethylene		
MS	MSD	RPD	MS	MSD	RPD	MS	MSD	RPD	MS	MSD	RPD	MS	MSD	RPD
96	101	5.1	97	101	4.0	98	102	4.0	103	108	4.7	88	99	11.8
102	101	1.0	94	100	6.2	95	100	5.1	104	108	3.8	103	84	20.3
83	106	24.3	93	109	15.8	97	101	4.0	85	112	27.4	94	99	5.2
97	97	0.0	100	99	1.0	97	98	1.0	105	104	1.0	101	99	2.0
98	99	1.0	100	100	0.0	100	96	4.1	105	107	1.9	100	98	2.0
101	102	1.0	102	100	2.0	102	100	2.0	107	106	0.9	101	101	0.0
99	100	1.0	107	106	0.9	98	97	1.0	107	106	0.9	99	106	6.8
105	107	1.9	105	106	0.9	104	106	1.9	103	104	1.0	99	102	3.0
111	105	5.6	109	102	6.6	110	102	7.5	108	102	5.7	105	100	4.9
110	106	3.7	108	108	0.0	110	108	1.8	108	106	1.9	106	104	1.9
104	102	1.9	102	98	4.0	104	100	3.9	102	102	0.0	98	94	4.2
104	106	1.9	98	102	4.0	96	98	2.1	104	108	3.8	94	98	4.2
Average														
101	103	4	101	103	4	101	101	3	103	106	4	99	99	6

QA objective for this analysis is +/- 50 % relative percent difference (RPD).

TABLE 4-20. SURROGATE RECOVERY OF TCLP ANALYSIS

Pretreatment		Average	+-	Std.Dev.
	d4-Dichloroethane	108	+-	2.8
	d8-Toluene	101	+-	1.9
	BFB	105	+-	2.4

Midtreatment		Average	+-	Std.Dev.
	d4-Dichloroethane	103	+-	4.7
	d8-Toluene	99	+-	1.8
	BFB	101	+-	2.0

Posttreatment		Average	+-	Std.Dev.
	d4-Dichloroethane	106	+-	10.3
	d8-Toluene	100	+-	3.4
	BFB	103	+-	4.2

QA Objective is 50 - 150 % Recovery.

TABLE 4-21. PRECEISION OF TCLP SAMPLING AND ANALYSIS

Sample ID	Sampling Date	Methylene Chloride			trans-1,2-Dichloro-ethylene			Trichloroethane			Trichloroethylene			Tetrachloroethylene		
		Conc. (mg/L)		RPD	Conc. (mg/L)		RPD	Conc. (mg/L)		RPD	Conc. (mg/L)		RPD	Conc. (mg/L)		RPD
MWS1/5	01-Dec-87	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
MWS1/8	02-Dec-87	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
EWS2/11	07-Dec-87	0.05	0.093	60 *	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
EWS3/5	08-Dec-87	0.069	0.082	17	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
EWS4/5	09-Dec-87	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
EWS4/10	09-Dec-87	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
EWS1/7	10-Dec-87	0.05	0.13	89 *	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
EWS1/8	10-Dec-87	0.05	0.076	41	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
MWS4/4	14-Dec-87	ND	ND	NC	ND	ND	NC	ND	ND	NC	0.1	0.2	67 *	ND	ND	NC
B1/7	15-Mar-88	ND	ND	NC	ND	ND	NC	ND	ND	NC	0.73	0.33	75 *	ND	ND	NC
B2/2	15-Mar-88	ND	ND	NC	0.49	0.4	20	ND	ND	NC	ND	ND	NC	ND	ND	NC
B2/7	15-Mar-88	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
B3/5	15-Mar-88	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
B4/11	16-Mar-88	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
B6/5	19-Apr-88	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
B6/10	19-Apr-88	1	0.05	181 *	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
B7/10	20-Apr-88	0.73	1.27	54 *	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
B8/6	20-Apr-88	0.81	0.05	177 *	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
B10/4	21-Apr-88	0.6	0.05	169 *	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
B10/6	21-Apr-88	0.14	0.05	95 *	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
B11/9	22-Apr-88	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
B12/5	22-Apr-88	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC	ND	ND	NC
B13/2	25-Apr-88	0.05	0.27	138 *	0.09	0.15	50	ND	ND	NC	5.8	5.2	11	ND	ND	NC

ND = Not Detected.

* = Value exceeds QA objective of +/- 50 % relative percent difference (RPD).

NC = Not Calculated. Precision values are calculated for reported concentrations greater than twice the quantitation limit.

TABLE 4-22. RESULTS OF ANALYSIS OF HEADSPACE LCSs

Sampling Date	Percent Recovery (MC)	(DCE)	(TRI)	(TCE)	(PCE)
12/03/87	100	111	105	102	88
3/16/88	106	111	105	95	85
3/17/88	96	100	94	82	76
3/18/88	90	94	90	81	74
3/19/88	120	120	119	107	96
3/20/88	99	104	98	89	81
4/20/88	98	105	96	91	79
	103	109	102	99	85
	80	90	78	82	63
	86	96	85	87	69
4/25/88	102	103	90	108	90
	83	97	85	83	71
Average %Rec =	97	103	96	92	80

QA Objective = 50 - 150%

ANALYTICAL DATA FROM SOIL BORINGS

PRETREATMENT

Sample Identification Number	Soil Depth	GC/MS Concentrations (mg/Kg)					Headspace Concentrations (mg/kg)				
		MeCl	DCE	TRI	TCE	PCE	MeCl	DCE	TRI	TCE	PCE
MWS1/1	0-2	<5	ND	ND	ND	ND	TRACE	TRACE	ND	TRACE	ND
MWS1/2	2-4	<5	ND	ND	13.40	ND	ND	TRACE	ND	TRACE	ND
MWS1/3	4-6	<5	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND
MWS1/4	6-8	<5	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND
MWS1/5	8-10	B	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND
MWS1/6	10-12	<5	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND
MWS1/7	12-14	<5	ND	ND	ND	ND	TRACE	TRACE	ND	TRACE	ND
MWS1/8	14-16	<5	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND
MWS1/9	16-18	<5	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND
MWS1/10	18-20	<5	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND
MWS1/11	20-22	<5	ND	ND	ND	ND	TRACE	TRACE	ND	TRACE	TRACE
MWS1/12	22-24	<5	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND
MWS1/13	24-26	<5	ND	ND	ND	ND	ND	TRACE	ND	ND	ND
EWS2/1	0-2	<5	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND
EWS2/2	2-4	<5	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND
EWS2/3	4-6	<5	ND	ND	ND	ND	ND	7.44	TRACE	27.61	TRACE
EWS2/4	6-8	<5	ND	ND	2.99	ND	ND	TRACE	ND	1.81	ND
EWS2/5	8-10	<5	ND	ND	13.60	ND	ND	ND	ND	ND	ND
EWS2/6	10-12	<5	ND	ND	5.36	ND	ND	TRACE	ND	TRACE	ND
EWS2/7	12-14	<5	ND	ND	3.62	ND	NR	-	-	-	-
EWS2/8	14-16	<5	ND	ND	9.54	ND	ND	ND	ND	ND	ND
EWS2/9	16-18	<5	ND	ND	ND	ND	ND	TRACE	ND	10.08	ND
EWS2/10	18-20	<5	ND	ND	ND	ND	ND	2.06	ND	14.21	ND
EWS2/11	20-22	<5	ND	ND	5.45	ND	ND	ND	ND	TRACE	ND
EWS2/12	22-24	<5	ND	ND	ND	ND	ND	ND	ND	TRACE	ND
EWS3/1	0-2	<5	ND	ND	ND-2.77	ND	TRACE	3.66	TRACE	71.87	TRACE
EWS3/2	2-4	<5	ND	ND	15.40	ND	ND	1.19	TRACE	67.17	TRACE
EWS3/3	4-6	<5	ND	ND	50.50	2.10	ND	TRACE	TRACE	109.08	2.12
EWS3/4	6-8	<5	ND	ND	6.41	ND	ND	TRACE	TRACE	70.53	TRACE
EWS3/5	8-10	<5	ND	ND	2.64	ND	ND	ND	ND	1.70	ND
EWS3/6	10-12	<5	ND	ND	4.90	ND	ND	TRACE	ND	15.98	ND
EWS3/7	12-14	<5	ND	ND	ND	ND	ND	ND	ND	ND	ND
EWS3/8	14-16	<5	ND	ND	ND	ND	ND	TRACE	ND	7.37	TRACE
EWS3/9	16-18	<5	ND	ND	ND	ND	ND	TRACE	ND	11.53	1.36
EWS3/10	18-20	<5	ND	ND	ND	ND	ND	ND	ND	ND	ND
EWS3/11	20-22	<5	ND	ND	ND	ND	ND	ND	ND	TRACE	ND
EWS3/12	22-24	<5	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWS2/1	0-2	B	ND	ND	4.06	ND	ND	1.44	TRACE	7.78	ND
MWS2/2	2-4	B	ND	ND	67.80	ND	ND	8.30	2.27	230.60	1.48
MWS2/3	4-6	8.20	ND	ND	83.00	ND	ND	3.16	1.48	281.89	2.65
MWS2/4	6-8	B	ND	ND	7.07	ND	ND	2.29	2.68	406.62	1.89

GROVELAND/TERRA VAC PROGRAM

ANALYTICAL DATA FROM SOIL BORINGS

PRETREATMENT

Sample Identification Number	Soil Depth	GC/MS Concentrations (mg/Kg)					Headspace Concentrations (mg/kg)				
		MeCl	DCE	TRI	TCE	PCE	MeCl	DCE	TRI	TCE	PCE
MWS2/5	8-10	<5	ND	ND	9.95	ND	ND	ND	ND	2.05	ND
MWS2/6	10-12	B	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWS2/7	12-14	B	ND	ND	ND	ND	ND	TRACE	ND	7.13	ND
MWS2/8	14-16	<5	ND	ND	ND	ND	ND	ND	ND	TRACE	ND
MWS2/9	16-18	<5	ND	ND	5.15	ND	ND	ND	ND	1.56	ND
MWS2/10	18-20	<5	ND	ND	ND	ND	ND	ND	ND	TRACE	ND
MWS2/11	20-22	<5	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWS2/12	22-24	<5	ND	ND	ND	ND	ND	ND	ND	TRACE	ND
EWS4/1	0-2	<5	ND	ND	2.94	ND	ND	TRACE	ND	2.78	TRACE
EWS4/2	2-4	<5	ND	ND	29.90	ND-8.69	ND	ND	ND	TRACE	ND
EWS4/3	4-6	<5	ND-2.16	ND	260.00	13.50	ND	2.16	TRACE	127.31	TR-3.38
EWS4/4	6-8	<5	ND	ND	303.00	8.80	ND	11.11	1.97	649.58	13.59
EWS4/5	8-10	<5	ND	ND	351.00	11.50	ND	TRACE	TRACE	68.17	1.86
EWS4/6	10-12	<5	ND	ND	195.00	6.62	ND	TRACE	TRACE	141.47	2.39
EWS4/7	12-14	<5	ND	ND	3.14	ND	ND	TRACE	TRACE	98.48	TRACE
EWS4/8	14-16	<5	ND	ND	ND-1.97	ND	ND	ND	ND	ND-1.97	ND
EWS4/9	16-18	<5	ND	ND	ND	ND	ND	TRACE	ND	1.56	ND
EWS4/10	18-20	<5	ND	ND	ND	ND	ND	TRACE	ND	3.83	ND
EWS4/11	20-22	<5	ND	ND	ND	ND	ND	TRACE	ND	2.53	ND
EWS4/12	22-24	<5	ND	ND	6.71	ND	ND	TRACE	ND	4.43	TRACE
MWS3/1	0-2	B	ND	ND	10.30	ND	NR	-	-	-	-
MWS3/2	2-4	<5	ND	ND	8.33	ND	ND	17.05	TRACE	56.77	TRACE
MWS3/3	4-6	7.50	ND-3.93	ND	80.00	ND	ND	ND	ND	TRACE	ND
MWS3/4	6-8	B	ND	ND	160.00	9.85	ND	4.10	1.66	315.31	3.90
MWS3/5	8-10	<5	ND	ND	ND	ND	ND	ND	ND	ND	1.66
MWS3/6	10-12	NR	-	-	-	-	NR	-	-	-	-
MWS3/7	12-14	<5	6.97	6.36	316.00	3.42	NR	-	-	-	-
MWS3/8	14-16	<5	2.11	3.48	195.00	ND	NR	-	-	-	-
MWS3/9	16-18	<5	ND	3.86	218.00	3.12	NR	-	-	-	-
MWS3/10	18-20	<5	20.40	36.80	1570.00	ND	NR	-	-	-	-
MWS3/11	20-22	<5	ND	ND	106.00	ND	NR	-	-	-	-
MWS3/12	22-24	<5	ND	ND	64.10	ND	NR	-	-	-	-
EWS1/1	0-2	<5	ND	ND	ND	ND	NR	-	-	-	-
EWS1/2	2-4	<5	ND	ND	ND	ND	NR	-	-	-	-
EWS1/3	4-6	<5	2.11	ND	61.0	2.22	ND	6.94	1.22	198.20	2.92
EWS1/4	6-8	<5	2.03	ND	328.00	8.31	ND	6.40	2.39	392.11	2.03
EWS1/5	8-10	<5	ND	ND	4.27-12.5	ND-3.6	ND	ND	ND	ND	ND
EWS1/6	10-12	<5	ND	ND	3.06	2.05	ND	ND-3.05	ND	ND-68.58	ND
EWS1/7	12-14	<5	ND	ND	3.15	ND	ND	6.40	1.53	93.76	2.12
EWS1/8	14-16	<5	ND	ND	ND	ND	ND	TRACE	TRACE	29.52	ND
EWS1/9	16-18	<5	ND	ND	ND	ND	ND	TRACE	TRACE	41.93	TRACE
EWS1/10	18-20	<5	ND	ND	ND	ND	ND	ND	ND	TRACE	ND
EWS1/11	20-22	<5	ND	ND	ND	ND	ND	TRACE	TRACE	7.60	ND
EWS1/12	22-24	<5	ND	ND	ND	1.28	ND	ND	ND	ND	ND

GROVELAND/TERRA VAC PROGRAM

ANALYTICAL DATA FROM SOIL BORINGS

PRETREATMENT

Sample Identification Number	Soil Depth	GC/MS Concentrations (mg/Kg)					Headspace Concentrations (mg/kg)				
		MeCl	DCE	TRI	TCE	PCE	MeCl	DCE	TRI	TCE	PCE
MWS4/1	0-2	<5	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWS4/2	2-4	<5	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWS4/3	4-6	<5	ND	ND	2.21	ND	ND	2.39	ND	40.68	1.49
MWS4/4	6-8	<5	ND	ND	3.25	ND	ND	7.46	TRACE	131.88	3.95
MWS4/5	8-10	<5	ND-6.8	ND	ND	ND	ND	ND-6.8	ND	7.38	3.29
MWS4/6	10-12	<5	ND	ND	ND-4.24	ND	ND	ND	ND	ND	ND
MWS4/7	12-14	<5	ND	ND	ND	ND	ND	TRACE	TRACE	15.18	3.33
MWS4/8	14-16	<5	ND	ND	ND	ND	ND	ND	ND	TRACE	ND
MWS4/9	16-18	<5	ND	ND	ND	ND	ND	ND	ND	TRACE	ND
MWS4/10	18-20	8	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWS4/11	20-22	<5	ND	ND	ND	ND	ND	ND	ND	ND	ND
MWS4/12	22-24	TRACE	ND	ND	ND	ND	ND	ND	ND	TRACE	ND

GROVELAND/TERRA VAC PROGRAM

ANALYTICAL DATA FROM SOIL BORINGS

PRETREATMENT

Sample Identification Number	Soil Depth	pH UNITS	OIL & GREASE ug/g	TOTAL ORGANIC CARBON ug/g	TCLP (mg/l)				
					MeCl	DCE	TRI	TCE	PCE
MWS1/1	0-2	6.28	3150	37300	TRACE	ND	ND	ND	ND
MWS1/2	2-4	6.26	1700	10900	TRACE	ND	ND	ND	ND
MWS1/3	4-6	6.49	1420	7980	ND	ND	ND	ND	ND
MWS1/4	6-8	6.35	1300	1190	TRACE	ND	ND	ND	ND
MWS1/5	8-10	6.29	560	910	TRACE	ND	ND	ND	ND
MWS1/6	10-12	6.4	444	940	TRACE	ND	ND	ND	ND
MWS1/7	12-14	6.21	221	1140	TRACE	ND	ND	ND	ND
MWS1/8	14-16	6.46	83	240	ND	ND	ND	ND	ND
MWS1/9	16-18	6.3	100-556	390	TRACE	ND	ND	ND	ND
MWS1/10	18-20	6.13	<92	420	TRACE	ND	ND	ND	ND
MWS1/11	20-22	NR	NR	3420	TRACE	ND	ND	ND	ND
MWS1/12	22-24	6.05	775	450	TRACE	ND	ND	ND	ND
MWS1/13	24-26	6.1	374	570	TRACE	ND	ND	ND	ND
EWS2/1	0-2	6.03	11730	54900	TRACE	ND	ND	ND	ND
EWS2/2	2-4	5.82	5320	9300	TRACE	ND	ND	ND	ND
EWS2/3	4-6	5.86	6080	11500	TRACE	ND	ND	ND	ND
EWS2/4	6-8	5.87	1300	9180	TRACE	ND	ND	ND	ND
EWS2/5	8-10	6.19	657	16100	TRACE	ND	TRACE	ND	ND
EWS2/6	10-12	6.17	3380	9950	0.054(B)	ND	ND	ND	ND
EWS2/7	12-14	NR	NR	NR	NR	-	-	-	-
EWS2/8	14-16	6.3	481	12100	TRACE	ND	ND	ND	ND
EWS2/9	16-18	6.37	1620	32900	TRACE	ND	ND	ND	ND
EWS2/10	18-20	6.53	1070	5510	TRACE	ND	ND	TRACE	ND
EWS2/11	20-22	6.44	894	5080	TR-0.093	ND	ND	ND	ND
EWS2/12	22-24	6.34	647	1160	TRACE	ND	ND	ND	ND
EWS3/1	0-2	6.59	6940	34600	TRACE	ND	ND	ND	ND
EWS3/2	2-4	NR	NR	17700	TRACE	ND	ND	ND	ND
EWS3/3	4-6	6.68	6370	17600	TRACE	ND	ND	ND	ND
EWS3/4	6-8	6.25	3300	16600	TRACE	ND	ND	0.185	ND
EWS3/5	8-10	6.16	2600	5600	0.069(B)	ND	ND	ND	ND
EWS3/6	10-12	6.51	355	4410	0.057(B)	ND	ND	TRACE	ND
EWS3/7	12-14	6.56	3880	858	0.050(B)	ND	ND	ND	ND
EWS3/8	14-16	5.81	377	496	0.054(B)	ND	ND	ND	ND
EWS3/9	16-18	5.88	1090	808	TRACE	ND	ND	ND	ND
EWS3/10	18-20	5.89	186	891	TRACE	ND	ND	ND	ND
EWS3/11	20-22	6.43	426	231	TRACE	ND	ND	ND	ND
EWS3/12	22-24	6.54	<88	1070	TRACE	ND	ND	ND	ND
MWS2/1	0-2	6.29	6250	8120	TRACE	ND	ND	ND	ND
MWS2/2	2-4	NR	NR	18600	0.062(B)	ND	ND	0.071	ND
MWS2/3	4-6	6.12	13970	26600	0.053(B)	ND	ND	0.238	ND
MWS2/4	6-8	6.23	5700	5820	0.056(B)	ND	ND	ND	ND

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ANALYTICAL DATA FROM SOIL BORINGS

PRETREATMENT

Sample Identification Number	Soil Depth	pH	OIL & GREASE	TOTAL ORGANIC CARBON	TCLP (mg/l)				
		UNITS	ug/g	ug/g	MeCl	DCE	TRI	TCE	PCE
MWS2/5	8-10	7.38	8800	427	0.055(B)	ND	ND	ND	ND
MWS2/6	10-12	6.93	2290	1580	0.093(B)	ND	ND	ND	ND
MWS2/7	12-14	6.73	870	1240	0.167(B)	ND	ND	ND	ND
MWS2/8	14-16	6.59	366	490	0.051(B)	ND	ND	ND	ND
MWS2/9	16-18	6.74	799	1600	TRACE	ND	ND	ND	ND
MWS2/10	18-20	7.2	454	136	TRACE	ND	ND	ND	ND
MWS2/11	20-22	6.25	376	60.3	TRACE	ND	ND	ND	ND
MWS2/12	22-24	7.32	<86	212	TRACE	ND	ND	ND	ND
EWS4/1	0-2	6.46	9420	2670	TRACE	ND	ND	ND	ND
EWS4/2	2-4	6.76	24500	2010	TRACE	ND	ND	ND	ND
EWS4/3	4-6	6.53	11720	18500	TRACE	ND	ND	0.264	ND
EWS4/4	6-8	6.27	14060	29100	TRACE	ND	ND	ND	ND
EWS4/5	8-10	6.3	21020	20000	TRACE	ND	ND	ND	ND
EWS4/6	10-12	6.28	15580	8780	ND	ND	ND	ND	ND
EWS4/7	12-14	6.38	2250	7220	TRACE	ND	ND	TRACE	ND
EWS4/8	14-16	5.95	<110	755	TRACE	ND	ND	ND	ND
EWS4/9	16-18	6.44	416	1490	TRACE	ND	ND	ND	ND
EWS4/10	18-20	6.46	834	1290	TRACE	ND	ND	ND	ND
EWS4/11	20-22	6.38	<115	1780	TRACE	ND	ND	ND	ND
EWS4/12	22-24	6.4	<98	204	TRACE	ND	ND	ND	ND
MWS3/1	0-2	NR	NR	29100	TRACE	ND	ND	TRACE	ND
MWS3/2	2-4	6.98	17670	12200	TRACE	ND	ND	TRACE	ND
MWS3/3	4-6	6.75	13550	15200	TRACE	ND	ND	0.136	ND
MWS3/4	6-8	6.15	13270	22000	TRACE	ND	ND	0.067	ND
MWS3/5	8-10	5.92	10350	1860	TRACE	ND	ND	ND	ND
MWS3/6	10-12	NR	NR	NR	NR	-	-	-	-
MWS3/7	12-14	5.8	4170	2810	TRACE	ND	TRACE	2.50	ND
MWS3/8	14-16	5.77	4870	5870	TRACE	ND	0.077	4.00	TRACE
MWS3/9	16-18	5.79	5890	6130	TRACE	0.053	0.11	5.00	TRACE
MWS3/10	18-20	5.92	4550	4170	TRACE	ND	ND	0.059	ND
MWS3/11	20-22	NR	NR	8530	TRACE	ND	ND	0.089	ND
MWS3/12	22-24	NR	NR	4210	TRACE	ND	ND	ND	ND
EWS1/1	0-2	NR	NR	NR	NR	-	-	-	-
EWS1/2	2-4	NR	NR	NR	NR	-	-	-	-
EWS1/3	4-6	6.89	9210	14800	TRACE	TRACE	ND	0.370	ND
EWS1/4	6-8	NR	NR	24500	TRACE	ND	ND	0.138	ND
EWS1/5	8-10	6.97	5600	6590	TRACE	ND	ND	ND	ND
EWS1/6	10-12	6.85	2260	506	TRACE	ND	ND	ND	ND
EWS1/7	12-14	6.57	3630	8540	TR-0.13	ND	ND	ND	ND
EWS1/8	14-16	6.45	629	1160	TR-0.076	ND	ND	ND	ND
EWS1/9	16-18	6.47	421	1260	TRACE	ND	ND	ND	ND
EWS1/10	18-20	6.44	118	159	TRACE	ND	ND	ND	ND
EWS1/11	20-22	6	95-236	764	TRACE	ND	ND	ND	ND
EWS1/12	22-24	5.96	153	148	TRACE	ND	ND	ND	ND

GROVELAND/TERRA VAC PROGRAM

ANALYTICAL DATA FROM SOIL BORINGS

PRETREATMENT

Sample Identification Number	Soil Depth	pH UNITS	OIL & GREASE ug/g	TOTAL ORGANIC CARBON ug/g	TCLP (mg/l)				
					MeCl	DCE	TRI	TCE	PCE
MWS4/1	0-2	6.38	808	1620	TRACE	ND	ND	ND	ND
MWS4/2	2-4	6.22	950	483	TRACE	ND	ND	ND	ND
MWS4/3	4-6	5.92	2290	15100	TRACE	ND	ND	TRACE	ND
MWS4/4	6-8	6.11	7270	7250	TRACE	ND	ND	TRACE	ND
MWS4/5	8-10	6	7090	8220	TRACE	ND	ND	TRACE	ND
MWS4/6	10-12	5.61	5660	8540	TRACE	ND	ND	ND	ND
MWS4/7	12-14	5.84	1010	1430	TRACE	ND	ND	ND	ND
MWS4/8	14-16	6.07	2010	973	TRACE	ND	ND	ND	ND
MWS4/9	16-18	6.25	2790	285	TRACE	ND	ND	ND	ND
MWS4/10	18-20	5.63	414	304	TRACE	ND	ND	ND	ND
MWS4/11	20-22	5.82	600	177	TRACE	ND	ND	ND	ND
MWS4/12	22-24	5.84	234	283	TRACE	ND	ND	ND	ND

GROVELAND/TERRA-VAC PROGRAM

ANALYTICAL DATA FROM SOIL BORINGS

MIDTREATMENT

Sample Identification Number	Soil Depth	GC/MS Concentrations (mg/Kg)					Headspace Concentrations (mg/kg)				
		MeCl	DCE	TRI	TCE	PCE	MeCl	DCE	TRI	TCE	PCE
B1/1	0-2	5.0(B)	ND	ND	280.0	TRACE	ND	TRACE	TRACE	49.01	TRACE
B1/2	2-4	5.0(B)	TRACE	TRACE	58.0	TRACE	TRACE	TRACE	TRACE	26.34	TRACE
B1/3	4-6	<5.0	ND	TRACE	190.0	TRACE	TRACE	3.71	TRACE	313.09	TRACE
B1/4	6-8	14	TRACE	TRACE	780.0	5.80	TRACE	TRACE	TRACE	274.07	TRACE
B1/5	8-10	14	ND	ND	TR-3.0	ND	TRACE	TRACE	ND	ND	ND
B1/6	10-12	5.6(B)	ND	ND	3.0	ND	ND	ND	ND	ND	ND
B1/7	12-14	5.6(B)	ND	ND	TRACE	ND	ND	TRACE	ND	TRACE	ND
B1/8	14-16	5.8(B)	ND	ND	5.4	ND	ND	TRACE	TRACE	29.52	ND
B1/9	16-18	5.0(B)	ND	ND	ND	ND	ND	TRACE	TRACE	TRACE	ND
B1/10	18-20	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND
B1/11	20-22	6.4(B)	ND	ND	ND	ND	ND	ND	ND	TRACE	ND
B1/12	22-24	<5.0	ND	ND	3.4	ND	ND	ND	ND	ND	ND
Boring #1 was located adjacent to monitoring well #2											
B2/1	0-2	<5.0	4.2	ND	2.4	ND	TRACE	TRACE	TRACE	TRACE	TRACE
B2/2	2-4	<5.0	16.0	ND	32.0	1.90	TRACE	25.32	TRACE	13.98	TRACE
B2/3	4-6	<5.0	5.0	ND	66.0	3.40	ND	ND	ND	TRACE	ND
B2/4	6-8	<5.0	TRACE	ND	4.0	ND	TRACE	2.23	ND	TRACE	TRACE
B2/5	8-10	<5.0	ND	ND	ND	ND	TRACE	TRACE	ND	TRACE	TRACE
B2/6	10-12	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
B2/7	12-14	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND
B2/8	14-16	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	TRACE
B2/9	16-18	<5.0	ND	ND	ND	ND	ND	TRACE	TRACE	TRACE	TRACE
B2/10	18-20	<5.0	ND	ND	TRACE	ND	ND	TRACE	TRACE	14.65	TRACE
B2/11	20-22	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND
B2/12	22-24	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
Boring #2 was located adjacent to monitoring well #3											
B3/1	0-2	<5.0	TRACE	ND	17.0	1.80	TRACE	TRACE	ND	TRACE	TRACE
B3/2	2-4	<5.0	TRACE	ND	TRACE	ND	TRACE	TRACE	ND	TRACE	TRACE
B3/3	4-6	<5.0	ND	ND	TRACE	ND	TRACE	TRACE	ND	TRACE	ND
B3/4	6-8	<5.0	ND	ND	ND	ND	TRACE	ND	ND	TRACE	ND
B3/5	8-10	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND
B3/6	10-12	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND
B3/7	12-14	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	TRACE
B3/8	14-16	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND
B3/9	16-18	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
B3/10	18-20	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND
B3/11	20-22	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
B3/12	22-24	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
Boring #3 was located adjacent to monitoring well #1											

ANALYTICAL DATA FROM SOIL BORINGS

MIDTREATMENT

Sample Identification Number	Soil Depth	GC/MS Concentrations (mg/Kg)					Headspace Concentrations (mg/kg)				
		MeCl	DCE	TRI	TCE	PCE	MeCl	DCE	TRI	TCE	PCE
B4/1	0-2	<5.0	ND	ND	ND	ND	TRACE	ND	ND	TRACE	TRACE
B4/2	2-4	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND
B4/3	4-6	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND
B4/4	6-8	<5.0	ND	ND	ND	ND	TRACE	ND	ND	TRACE	TRACE
B4/5	8-10	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
B4/6	10-12	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND
B4/7	12-14	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND
B4/8	14-16	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
B4/9	16-18	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
B4/10	18-20	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
B4/11	20-22	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
B4/12	22-24	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND

Boring #4 was located adjacent to monitoring well #4

GROVELAND/TERRA-VAC PROGRAM

ANALYTICAL DATA FROM SOIL BORINGS

MIDTREATMENT

Sample Identification Number	Soil Depth	pH UNITS	OIL & GREASE ug/g	TOTAL ORGANIC CARBON ug/g	TCLP (mg/l) MeCl	DCE	TRI	TCE	PCE
B1/1	0-2	7.67	14600	12700	TRACE	0.072	TRACE	4.90	ND
B1/2	2-4	NR	NR	NR	TRACE	ND	ND	2.00	ND
B1/3	4-6	NR	NR	NR	TRACE	0.072	ND	4.50	ND
B1/4	6-8	NR	NR	NR	TRACE	TRACE	TRACE	6.60	TRACE
B1/5	8-10	7.19	8590	4280	TRACE	ND	ND	TRACE	ND
B1/6	10-12	6.90	4560	2240	TRACE	ND	ND	TRACE	ND
B1/7	12-14	6.87	839	1040	TRACE	ND	ND	0.10	ND
B1/8	14-16	6.50	447	2100	TRACE	ND	ND	0.06	ND
B1/9	16-18	6.67	242	1360	TRACE	ND	ND	TRACE	ND
B1/10	18-20	6.92	<172	209	TRACE	ND	ND	TRACE	ND
B1/11	20-22	6.56	<174	249	TRACE	ND	ND	TRACE	ND
B1/12	22-24	6.47	209	213	TRACE	ND	ND	TRACE	ND
Boring #1 was located adjacent to monitoring well #2									
B2/1	0-2	6.39	3430	7520	TRACE	TRACE	ND	TRACE	ND
B2/2	2-4	6.52	9730	12000	TRACE	0.49	ND	0.73	TRACE
B2/3	4-6	6.32	16400	6820	TRACE	0.44	TRACE	4.70	0.064
B2/4	6-8	6.34	762	11900	TRACE	0.13	ND	0.30	TRACE
B2/5	8-10	6.38	229	1020	TRACE	ND	ND	TRACE	ND
B2/6	10-12	6.57	2635	1970	TRACE	ND	ND	TRACE	ND
B2/7	12-14	6.57	209	339	TRACE	ND	ND	TRACE	ND
B2/8	14-16	5.90	<192	844	TRACE	ND	ND	ND	ND
B2/9	16-18	6.17	<202	589	TRACE	ND	ND	TRACE	ND
B2/10	18-20	6.30	816	2950	TRACE	ND	ND	TRACE	ND
B2/11	20-22	6.82	333	195	TRACE	ND	ND	ND	ND
B2/12	22-24	6.83	365	794	TRACE	ND	ND	ND	ND
Boring #2 was located adjacent to monitoring well #3									
B3/1	0-2	6.73	1960	6550	TRACE	TRACE	ND	0.24	TRACE
B3/2	2-4	6.85	606	5820	TRACE	0.12	ND	0.40	ND
B3/3	4-6	6.87	647	3640	TRACE	ND	ND	TRACE	ND
B3/4	6-8	7.00	1650	1470	TRACE	ND	ND	TRACE	ND
B3/5	8-10	7.03	1080	2120	TRACE	ND	ND	TRACE	ND
B3/6	10-12	6.90	365	617	TRACE	ND	ND	ND	ND
B3/7	12-14	7.01	323	1050	TRACE	ND	ND	ND	ND
B3/8	14-16	7.31	274	116	TRACE	ND	ND	ND	ND
B3/9	16-18	6.90	<174	161	TRACE	ND	ND	ND	ND
B3/10	18-20	7.26	<158	149	TRACE	ND	ND	ND	ND
B3/11	20-22	7.14	<152	91	TRACE	ND	ND	ND	ND
B3/12	22-24	7.17	<166	73	0.078(B)	ND	ND	ND	ND

Boring #3 was located adjacent to monitoring well #1

GROVELAND/TERRA-VAC PROGRAM

ANALYTICAL DATA FROM SOIL BORINGS

MIDTREATMENT

Sample Identification Number	Soil Depth	pH UNITS	OIL & GREASE ug/g	TOTAL ORGANIC CARBON ug/g	TCLP (mg/l)				
					MeCl	DCE	TRI	TCE	PCE
B4/1	0-2	6.77	259	1540	0.073(B)	ND	ND	TRACE	ND
B4/2	2-4	7.23	<170	2920	0.062(B)	ND	ND	ND	ND
B4/3	4-6	7.18	<190	2300	TRACE	ND	ND	TRACE	ND
B4/4	6-8	7.40	2820	1400	TRACE	ND	ND	ND	ND
B4/5	8-10	6.69	318	1040	TRACE	ND	ND	ND	ND
B4/6	10-12	6.22	<184	875	TRACE	ND	ND	ND	ND
B4/7	12-14	6.96	<170	1240	TRACE	ND	ND	ND	ND
B4/8	14-16	7.12	<166	185	TRACE	ND	ND	ND	ND
B4/9	16-18	6.89	<164	185	TRACE	ND	ND	ND	ND
B4/10	18-20	7.43	191	96	TRACE	ND	ND	ND	ND
B4/11	20-22	7.41	<166	57	TRACE	ND	ND	ND	ND
B4/12	22-24	7.37	<170	193	TRACE	ND	ND	ND	ND

Boring #4 was located adjacent to monitoring well #4

ANALYTICAL DATA FROM SOIL BORINGS

POST TREATMENT

Sample Identification Number	Soil Depth	GC/MS Concentrations (mg/Kg)					Headspace Concentrations (mg/kg)				
		MeCl	DCE	TRI	TCE	PCE	MeCl	DCE	TRI	TCE	PCE
B6/1	0-2	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND
B6/2	2-4	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND
B6/3	4-6	<5.0	TRACE	ND	TRACE	ND	ND	TRACE	ND	TRACE	ND
B6/4	6-8	NR	-	-	-	-	NR	-	-	-	-
B6/5	8-10	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
B6/6	10-12	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
B6/7	12-14	NR	-	-	-	-	NR	-	-	-	-
B6/8	14-16	NR	-	-	-	-	NR	-	-	-	-
B6/9	16-18	<5.0	ND	ND	23	ND	ND	TRACE	ND	17.42	ND
B6/10	18-20	<5.0	ND	ND	5.30	ND	ND	TRACE	ND	17.05	TRACE
B6/11	20-22	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND
B6/12	22-24	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
Boring #6 was located adjacent to extraction well #2											
B7/1	0-2	<5.0	ND	ND	ND	ND	ND	ND	ND	1.27	TRACE
B7/2	2-4	<5.0	ND	ND	2.40	ND	ND	TRACE	ND	9.26	TRACE
B7/3	4-6	<5.0	ND	ND	45.0	ND	ND	TRACE	ND	11.00	TRACE
B7/4	6-8	<5.0	ND	ND	19.0	ND	ND	TRACE	ND	18.00	ND
B7/5	8-10	<5.0	ND	ND	6.0	ND	ND	TRACE	ND	TRACE	ND
B7/6	10-12	<5.0	ND	ND	12	TRACE	ND	TRACE	ND	5.20	TRACE
B7/7	12-14	<5.0	ND	ND	16	ND	ND	TRACE	ND	2.30	ND
B7/8	14-16	<5.0	ND	ND	TRACE	ND	ND	TRACE	ND	2.00	ND
B7/9	16-18	<5.0	ND	ND	5.90	ND	ND	1.20	TRACE	8.70	ND
B7/10	18-20	<5.0	ND	ND	12	ND	ND	TRACE	ND	6.30	ND
B7/11	20-22	<5.0	2.50	ND	33	ND	ND	TRACE	ND	4.10	ND
B7/12	22-24	<5.0	ND	ND	TRACE	ND	ND	TRACE	ND	5.80	ND
Boring #7 was located adjacent to extraction well #3											
B8/1	0-2	<5.0	ND	ND	TRACE	ND	ND	ND	ND	TRACE	ND
B8/2	2-4	<5.0	2.20	ND	100	TRACE	ND	1.70	ND	29.00	ND
B8/3	4-6	NR	-	-	-	-	NR	-	-	-	-
B8/4	6-8	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
B8/5	8-10	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
B8/6	10-12	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
B8/7	12-14	<5.0	ND	ND	7.70	ND	ND	ND	ND	TRACE	ND
B8/8	14-16	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
B8/9	16-18	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
B8/10	18-20	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND
B8/11	20-22	11	ND	ND	ND	ND	ND	TRACE	ND	3.70	ND
B8/12	22-24	5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
Boring #8 was located adjacent to monitoring well #2											
B9/1	0-2	<5.0	1.70	ND	3.60	ND	ND	ND	ND	ND	ND
B9/2	2-4	<5.0	1.40	ND	7.70	ND	ND	3.20	ND	9.10	TRACE
B9/3	4-6	<5.0	ND	ND	13	ND	ND	2.10	ND	9.50	ND
B9/4	6-8	1.4(B)	ND	ND	TRACE	ND	ND	ND	ND	TRACE	ND

ANALYTICAL DATA FROM SOIL BORINGS

POST TREATMENT

Sample Identification Number	Soil Depth	GC/MS Concentrations (mg/Kg)					Headspace Concentrations (mg/kg)				
		MeCl	DCE	TRI	TCE	PCE	MeCl	DCE	TRI	TCE	PCE
B9/5	8-10	<5.0	ND	ND	22	ND	ND	ND	ND	5.80	TRACE
B9/6	10-12	<5.0	ND	ND	240	6.6	ND	2.60	ND	134.00	1.3
B9/7	12-14	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND
B9/8	14-16	<5.0	ND	ND	24	ND	NR	-	-	-	-
B9/9	16-18	<5.0	ND	ND	5.4	ND	ND	TRACE	ND	10.30	TRACE
B9/10	18-20	<5.0	ND	ND	36	ND	ND	TRACE	ND	32.50	TRACE
B9/11	20-22	NR	-	-	-	-	NR	-	-	-	-
B9/12	22-24	NR	-	-	-	-	NR	-	-	-	-
Boring #9 was located adjacent to extraction well #1											
B10/1	0-2	<5.0	ND	ND	2.3	ND	ND	TRACE	ND	TRACE	ND
B10/2	2-4	<5.0	ND	ND	7.5	ND	ND	2.90	ND	11.70	TRACE
B10/3	4-6	<5.0	ND	ND	4.5	ND	ND	ND	ND	ND	ND
B10/4	6-8	<5.0	ND	ND	1.3	ND	ND	ND	ND	TRACE	ND
B10/5	8-10	<5.0	ND	ND	TRACE	ND	ND	ND	ND	ND	ND
B10/6	10-12	<5.0	ND	ND	1.60	TRACE	ND	ND	ND	TR-5.04	ND
B10/7	12-14	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND
B10/8	14-16	<5.0	ND	ND	4.30	ND	ND	TRACE	ND	TRACE	ND
B10/9	16-18	<5.0	ND	ND	5.70	ND	ND	ND	ND	ND	ND
B10/10	18-20	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
B10/11	20-22	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
B10/12	22-24	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
Boring #10 was located adjacent to monitoring well #4											
B11/1	0-2	<5.0	ND	ND	2.40	ND	ND	1.23	ND	8.40	TRACE
B11/2	2-4	<5.0	ND	ND	1.70	ND	ND	TRACE	ND	TRACE	ND
B11/3	4-6	<5.0	ND	ND	ND	ND	ND	3.01	ND	1.50	ND
B11/4	6-8	<5.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND
B11/5	8-10	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
B11/6	10-12	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
B11/7	12-14	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND
B11/8	14-16	<5.0	ND	ND	ND	ND	ND	3.07	ND	TRACE	ND
B11/9	16-18	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
B11/10	18-20	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
B11/11	20-22	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
B11/12	22-24	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
Boring #11 was located adjacent to monitoring well #1											
B12/1	0-2	8.7	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND
B12/2	2-4	6.7	ND	ND	ND	ND	ND	1.90	ND	1.40	ND
B12/3	4-6	8.6	4.9	ND	39	1.80	ND	TRACE	ND	6.20	ND
B12/4	6-8	<5.0	TRACE	ND	9.0	1.10	ND	1.80	ND	11.00	ND
B12/5	8-10	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
B12/6	10-12	6.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
B12/7	12-14	<5.0	ND	ND	2.30	ND	ND	TRACE	ND	ND	ND

ANALYTICAL DATA FROM SOIL BORINGS

POST TREATMENT

Sample Identification Number	Soil Depth	GC/MS Concentrations (mg/Kg)					Headspace Concentrations (mg/kg)				
		MeCl	DCE	TRI	TCE	PCE	MeCl	DCE	TRI	TCE	PCE
B12/8	14-16	<5.0	ND	ND	ND	ND	ND	TRACE	ND	2.30	ND
B12/9	16-18	<5.0	ND	ND	ND	ND	ND	TRACE	ND	TRACE	ND
B12/10	18-20	<5.0	ND	ND	ND	ND	ND	TRACE	ND	1.95	ND
B12/11	20-22	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
B12/12	22-24	<5.0	ND	ND	TRACE	ND	ND	TRACE	ND	ND	ND

Boring #12 was located adjacent to extraction well #4

Sample Identification Number	Soil Depth	GC/MS Concentrations (mg/Kg)					Headspace Concentrations (mg/kg)				
		MeCl	DCE	TRI	TCE	PCE	MeCl	DCE	TRI	TCE	PCE
B13/1	0-2	<25.0	ND	ND	ND	ND	ND	ND	ND	TRACE	ND
B13/2	2-4	<25.0	59.00	ND	800.00	ND	ND	22.00	ND	300.00	ND
B13/3	4-6	<25.0	ND	ND	84.00	ND	ND	1.60	ND	18.00	ND
B13/4	6-8	<5.0	ND	ND	ND	ND	ND	TRACE	ND	ND	ND
B13/5	8-10	<5.0	ND	ND	63.00	4.30	ND	TRACE	ND	ND	ND
B13/6	10-12	<5.0	ND	ND	2.30	ND	ND	TRACE	ND	27.00	ND
B13/7	12-14	<5.0	ND	ND	ND	ND	ND	2.50	ND	17.00	ND
B13/8	14-16	<5.0	ND	ND	ND	ND	ND	1.10	ND	6.80	ND
B13/9	16-18	<5.0	ND	ND	62	ND	ND	TRACE	TRACE	91.00	ND
B13/10	18-20	<5.0	ND	ND	2.4	ND	ND	ND	ND	ND	ND
B13/11	20-22	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
B13/12	22-24	<5.0	ND	ND	ND	ND	ND	TRACE	ND	ND	ND

Boring #13 was located adjacent to monitoring well #3

GROVELAND/TERRA-VAC PROGRAM

ANALYTICAL DATA FROM SOIL BORINGS

POST TREATMENT

Sample Identification Number	Soil Depth	pH UNITS	OIL & GREASE ug/g	TOTAL ORGANIC CARBON ug/g	TCLP (mg/l)				
					MeCl	DCE	TRI	TCE	PCE
B9/5	8-10	7.04	5040	4600	TRACE	ND	ND	0.071	ND
B9/6	10-12	7.37	7460	4500	TRACE	ND	ND	1.2	ND
B9/7	12-14	8.80	1080	3230	0.59(B)	ND	ND	TRACE	ND
B9/8	14-16	NR	NR	NR	TRACE	ND	ND	0.77	ND
B9/9	16-18	8.46	1570	3630	TRACE	ND	ND	TRACE	ND
B9/10	18-20	7.81	996	2240	TRACE	ND	ND	ND	ND
B9/11	20-22	NR	NR	NR	NR	-	-	-	-
B9/12	22-24	NR	NR	NR	NR	-	-	-	-
Boring #9 was located adjacent to extraction well #1									
B10/1	0-2	7.49	908	4660	0.72(B)	ND	ND	ND	ND
B10/2	2-4	7.32	4040	6350	0.092	ND	ND	0.35	ND
B10/3	4-6	7.54	5730	10900	0.52(B)	ND	ND	TRACE	ND
B10/4	6-8	7.53	6330	5980	TR-0.60(B	ND	ND	ND	ND
B10/5	8-10	7.51	10700	7610	TRACE	ND	ND	ND	ND
B10/6	10-12	6.95	5580	4760	TR-0.14(B	ND	ND	ND	ND
B10/7	12-14	6.79	512	1200	0.07	ND	ND	ND	ND
B10/8	14-16	7.01	620	6150	TRACE	ND	ND	TRACE	ND
B10/9	16-18	7.64	<165	213	TRACE	ND	ND	ND	ND
B10/10	18-20	8.06	234	960	0.70(B)	ND	ND	ND	ND
B10/11	20-22	7.26	311	79	0.41(B)	ND	ND	ND	ND
B10/12	22-24	6.99	303	111	TRACE	ND	ND	ND	ND
Boring #10 was located adjacent to monitoring well #4									
B11/1	0-2	7.14	5670	15700	TRACE	ND	ND	ND	ND
B11/2	2-4	6.12	5000	13500	0.18(B)	ND	ND	0.13	ND
B11/3	4-6	6.53	3720	4750	0.41(B)	ND	ND	0.02	ND
B11/4	6-8	6.65	2350	2290	TRACE	ND	ND	ND	ND
B11/5	8-10	6.32	3250	2580	TRACE	ND	ND	ND	ND
B11/6	10-12	6.30	370	1580	TRACE	ND	ND	ND	ND
B11/7	12-14	6.12	<189	1560	0.28(B)	ND	ND	ND	ND
B11/8	14-16	6.87	<163	650	0.67(B)	ND	ND	ND	ND
B11/9	16-18	6.69	<170	154	TRACE	ND	ND	ND	ND
B11/10	18-20	7.46	<189	79	TRACE	ND	ND	ND	ND
B11/11	20-22	7.07	<175	67	0.75(B)	ND	ND	ND	ND
B11/12	22-24	7.41	<163	90	TRACE	ND	ND	ND	ND
Boring #11 was located adjacent to monitoring well #1									
B12/1	0-2	7.35	2370	5000	TRACE	ND	ND	0.01	ND
B12/2	2-4	7.07	6330	7200	TRACE	0.09	ND	0.013	ND
B12/3	4-6	6.88	10700	10500	1.9	ND	ND	0.09	ND
B12/4	6-8	6.22	9530	17500	TRACE	ND	ND	0.10	ND
B12/5	8-10	6.15	<167-877	3820	TRACE	ND	ND	ND	ND
B12/6	10-12	6.78	<167	373	0.34(B)	ND	ND	ND	ND
B12/7	12-14	7.80	881	199	TRACE	ND	ND	ND	ND

GROVELAND/TERRA-VAC PROGRAM

ANALYTICAL DATA FROM SOIL BORINGS

POST TREATMENT

Sample Identification Number	Soil Depth	pH UNITS	OIL & GREASE ug/g	TOTAL ORGANIC CARBON ug/g	TCLP (mg/l)				
					MeCl	DCE	TRI	TCE	PCE
B12/8	14-16	6.54	994	6810	0.28(B)	ND	ND	TRACE	ND
B12/9	16-18	6.13	243	1000	0.37(B)	ND	ND	ND	ND
B12/10	18-20	6.18	<167	945	TRACE	ND	ND	ND	ND
B12/11	20-22	6.30	<167	439	TRACE	ND	ND	ND	ND
B12/12	22-24	6.02	<171	498	TRACE	ND	ND	ND	ND

Boring #12 was located adjacent to extraction well #4

Sample Identification Number	Soil Depth	pH UNITS	OIL & GREASE ug/g	TOTAL ORGANIC CARBON ug/g	MeCl	DCE	TRI	TCE	PCE
B13/1	0-2	6.95	4490	5340	ND	ND	ND	ND	ND
B13/2	2-4	6.39	21500	10800	TR-0.27	0.09	ND	5.8	ND
B13/3	4-6	6.20	14200	26900	TRACE	0.46	ND	0.37	ND
B13/4	6-8	6.63	21400	16500	TRACE	ND	ND	0.06	ND
B13/5	8-10	6.62	14800	11700	0.06(B)	ND	ND	ND	ND
B13/6	10-12	6.73	7040	6040	0.06(B)	ND	ND	ND	ND
B13/7	12-14	6.58	<191	760	TRACE	ND	ND	ND	ND
B13/8	14-16	6.38	<186	718	TRACE	ND	ND	ND	ND
B13/9	16-18	6.07	725	931	ND	ND	ND	ND	ND
B13/10	18-20	6.76	415	844	TRACE	ND	ND	ND	ND
B13/11	20-22	6.48	<169	239	0.48(B)	ND	ND	ND	ND
B13/12	22-24	6.58	<167	12600	ND	ND	ND	ND	ND

Boring #13 was located adjacent to monitoring well #3

GROVELAND/TERRA-VAC PROGRAM

ANALYTICAL DATA FROM SOIL BORINGS

POST TREATMENT

Sample Identification Number	Soil Depth	pH UNITS	OIL & GREASE ug/g	TOTAL ORGANIC CARBON ug/g	TCLP (mg/l) MeCl	DCE	TRI	TCE	PCE
B6/1	0-2	7.16	2750	3500	TRACE	ND	ND	ND	ND
B6/2	2-4	6.83	6530	4920	TRACE	ND	ND	TRACE	ND
B6/3	4-6	6.90	8460	6800	TRACE	ND	ND	ND	ND
B6/4	6-8	NR	NR	NR	NR	-	-	-	-
B6/5	8-10	6.95	390	383	TRACE	ND	ND	ND	ND
B6/6	10-12	6.97	642	927	TRACE	ND	ND	ND	ND
B6/7	12-14	NR	NR	NR	NR	-	-	-	-
B6/8	14-16	NR	NR	NR	0.55(B)	ND	ND	ND	ND
B6/9	16-18	6.55	1660	5490	0.80(B)	ND	ND	TRACE	ND
B6/10	18-20	6.37	603	2930	TR-1.0(B)	ND	ND	ND	ND
B6/11	20-22	6.89	793	3480	1.50(B)	ND	ND	ND	ND
B6/12	22-24	6.84	912	1260	TRACE	ND	ND	ND	ND
Boring #6 was located adjacent to extraction well #2									
B7/1	0-2	6.89	4680	8410	TRACE	ND	ND	TRACE	ND
B7/2	2-4	7.50	6420	8080	TRACE	ND	ND	TRACE	ND
B7/3	4-6	7.38	9470	8410	TRACE	ND	ND	0.28	ND
B7/4	6-8	7.20	9170	12100	TRACE	ND	ND	0.44	ND
B7/5	8-10	6.87	9470	11900	TRACE	ND	ND	0.05	ND
B7/6	10-12	7.00	4340	6180	0.43(B)	ND	ND	0.13	ND
B7/7	12-14	6.88	887	6790	0.88(B)	ND	ND	0.23	ND
B7/8	14-16	6.52	2420	5180	1.50(B)	ND	ND	ND	ND
B7/9	16-18	6.05	680	2710	TRACE	ND	ND	0.16	ND
B7/10	18-20	5.71	665	1720	0.73(B)	ND	ND	TRACE	ND
B7/11	20-22	6.50	793	1590	TRACE	ND	ND	0.15	ND
B7/12	22-24	6.86	<152	378	TRACE	ND	ND	ND	ND
Boring #7 was located adjacent to extraction well #3									
B8/1	0-2	6.66	4090	12300	0.80(B)	ND	ND	ND	ND
B8/2	2-4	6.39	13800	25100	0.68(B)	TRACE	ND	ND	ND
B8/3	4-6	NR	NR	NR	NR	-	-	-	-
B8/4	6-8	6.73	3400	3740	1.20(B)	ND	ND	ND	ND
B8/5	8-10	6.69	4070	3340	1.40(B)	ND	ND	ND	ND
B8/6	10-12	7.04	384	1070	TR-0.81(B	ND	ND	ND	ND
B8/7	12-14	6.82	6160	9770	0.10(B)	ND	ND	ND	ND
B8/8	14-16	6.68	270	640	0.07	ND	ND	ND	ND
B8/9	16-18	6.82	824	395	0.05	ND	ND	TRACE	ND
B8/10	18-20	6.95	597	363	ND	ND	ND	TRACE	ND
B8/11	20-22	6.94	1100	1310	TRACE	ND	ND	ND	ND
B8/12	22-24	7.31	<157	86	TRACE	ND	ND	ND	ND
Boring #8 was located adjacent to monitoring well #2									
B9/1	0-2	7.22	8390	8130	TRACE	ND	ND	ND	ND
B9/2	2-4	6.78	37400	16600	0.34(B)	TRACE	ND	0.20	ND
B9/3	4-6	6.92	12800	16900	1.30(B)	ND	ND	0.13	ND
B9/4	6-8	7.03	3700	2380	1.4(B)	ND	ND	TRACE	ND

- Pretreatment

  - Vacuum monitoring wells were constructed at two discrete depths (shallow, deep) in each of the four boreholes. These wells were completed with 2-inch PVC casing and not 1/4-inch Teflon as had been mentioned in the QA project plan.

  - Shallow soil gas samples were collected from vacuum monitoring wells and hand driven stainless steel tubes. Punch bar holes were not used for sample collection because the stainless steel tubes proved to be a better sampling technique.

- Commissioning

  - Commissioning of each well required less than the expected eight hours. Terra-Vac representatives conducted this test until trends in flow rates and gas concentrations were established. In-line flow meters were not provided. Flows were measured with a large rotometer that was moved from well to well.

- Active Treatment

  - The process gas sampling schedule was revised as follows:

Location	Week #1	Remainder of program
EW2S, EW1D	2/day	1/day
EW2S, EW2D EW3S, EW3D EW4S, EW4D	1/day	every other day
VW1S, VW1D VW2S, VW2D VW3S, VW3D VW4S, VW4D	1/day	every other day
Separator inlet *Primary carbon out Secondary carbon out	1/day	1/week

*Primary carbon was actually monitored more closely in order to detect breakthrough.

ANALYTICAL METHODS AND CALIBRATION

pH

Soil pH was determined without deviation from the QAPP.

Oil and Grease

Oil and grease was determined without deviation from the QAPP.

TOC

TOC was determined without deviation from the QAPP. Samples from the Pretreatment phase were analyzed at metaTRACE Laboratories due to an instrument malfunction at the Alliance Laboratory. All other TOC samples were analyzed at Alliance.

Soil and Process Gas

Soil and process gases were analyzed in accordance with the procedures provided in Appendix H. Reported concentrations of TDE and TCE were quantified using GC/FID because the levels generally exceeded the calibration range of the ECD. FID calibration curves were generated using a linear regression analysis with the y-intercept forced through zero. Quantitation of TRI and PCE was performed using GC/ECD. Calibration curves were analyzed using a quadratic fit equation due to the non-linear response typical of the detector.

Activated Carbon

Analysis of carbon canister samples was performed in accordance with Section 5.2.7 of the QAPP. A 1.5 to 2.0 gram sample of carbon was desorbed with 10 mL of carbon disulfide. GC/FID analysis was conducted using a Hewlett-Packard 5890 gas chromatograph.

Separator Liquid

Separator liquid was analyzed by purge and trap GC/MS in place of GC/HECD as stated in the QAPP due to instrument malfunctions. Calibration and analysis were in accordance with SW 846 Method 8240.

Soil

Soil samples were dispersed in methanol and analyzed by purge and trap GC/MS using the procedures detailed in the QAPP. It was anticipated that the low-level purge and trap method described in Method 8240 would be utilized if headspace concentrations for mid and post-treatment samples were in the 3 to 5 ppm range. This method which employs a soil impinger for the direct analysis of a 5 gram sample was not implemented because the samples contained significant concentrations of oily material which would have caused matrix interferences.

TCLP Leachates

Generation and analysis of TCLP leachates was performed as detailed in the QAPP. One deviation in the procedure was the use of 40 mL VOA vials to collect ZHE extracts in place of Tedlar bags or syringes as listed in Section 5.2.2 of the QAPP. An additional deviation from the holding time for leachate generation is discussed later in this section.

DATA REDUCTION VALIDATION AND REPORTING

Data reduction, validation, and reporting procedures described in Section 6 of the QAPP were followed during this program. The only data reduction change made during the course of the program was in the calculation of the onsite GC calibration curves.

While onsite, the analyst used a standard linear regression with a finite Y-intercept to calculate the calibration curves for both detectors (ECD and FID). After reducing the data it became apparent that these curves did not provide the best fit to use for calculating the POHC concentrations.

The FID data was revised by recalculating the calibration curves using a linear regression with a Y-intercept forced through zero. Forcing the intercept through zero provided a more reliable value for the lower POHC concentrations without altering the higher concentrations.

Due to the non-linearity of the ECD at higher concentrations, the calibration curve was calculated using the following quadratic fit equation:

$$Y = \text{Slope } 1\ (X) + \text{Slope } 2\ (X^2)$$

where Y = Concentration and X = Peak Area

INTERNAL QUALITY CONTROL CHECKS

Internal QC procedures for Data Collection, Sampling and Analysis, described in Section 7 of the QAPP were followed during the course of the program.

Initially Terra-Vac was to be responsible for taking all process operation readings and transfer the data to Alliance onsite personnel. Since Alliance was onsite every day of the program and Terra-Vac did not plan to be, Alliance personnel decided to use the Terra-Vac supplied instruments and take the measurements themselves. Flow rate measurements were taken utilizing a rotometer manufactured by Blue-White Industries, not a Dwyer stainless steel pitot tube as originally stated. Vacuum readings were taken at each well head and the separator inlet with a guage.

The precision of the flow rate and pressure measurements were never assessed by Terra-Vac as indicated in the QAPP. The system was not designed to enable a redundant measurement as specified. Also, the summation of flows from each well head could not be compared to a measurement at the separator inlet because a measurement port was not made available. From our observation, Terra-Vac did not take any steps as outlined above to assure the quality of the measurements from their instruments.

PERFORMANCE AND SYSTEM AUDITS

Numerous audits were conducted by both Alliance staff and external auditors during the course of this program. The full Audit Reports are available for review from the project file. A brief summary of the audit results follows:

Internal Audits

A system audit was conducted by the Alliance QA Officer in December 1987 during the pretreatment period of the program. The audit focused on the sampling and onsite analysis portions of the pretreatment period which included all activities before commissioning and start-up of the vacuum extraction unit. During the inspection of the onsite GC/ECD analysis it was noted that the analyst was getting very high TCE readings which required diluting the sample 200X and more to get quantifiable values. Discussions arose about bringing up a GC equipped with an FID to analyze the high concentration samples. This was done the next day and a modified onsite analytical scheme for process and soil gas was prepared. A review of the chain-of-custody forms showed that the number of Split Spoon, Shelby Tube, and Soil Gas samples collected were very close to what was stated in the QA Plan and that the percent completeness of sample collection ran from 90-100 percent.

In January, the Alliance QA Officer conducted a review of the chain-of-custody forms for samples collected during the commissioning/start-up period of the program. Again the samples collected were compared to what was stated in the QA Plan. The review showed that the number of samples collected from the Process Gas Streams, Separator Drain, and Extraction Well Gas were the same as or more than what was stated in the QA Plan with percent completeness ranging from 100-128 percent.

External Audits

A series of three external audits were conducted on Alliance's work during the course of the program. The first was a field audit conducted by S-Cubed during January 1988. The audit was rated "Acceptable with

Qualifications" which meant that the minimum criteria was satisfied and good data quality is likely, however some minor deficiencies were revealed. The deficiencies were items such as failure of the analyst to initial chromatograms, not monitoring the refrigerator temperature which was used to store stock GC standards and failure to record oven temperature used for preparation of sampling equipment and calibration standards. All of these items were discussed with the field crew and were included in the routine operation from then on.

During February 1988, a Technical System Review was conducted at Alliance Technologies laboratory in Bedford, MA by PEI Associates, Inc. The review was conducted to determine the status of TCLP extraction and subsequent analysis of the ZHE extract of 103 pretreatment samples for the 5 POHCs. Earlier, Alliance notified Enviresponse that the holding times for these analyses had been exceeded. The samples were originally scheduled to be analyzed by metaTRACE, Inc., however, when Alliance discovered that the 14 day holding time for extraction was not met, they recalled the samples to continue the extraction and analyses on the remaining samples at Alliances lab. Although no concerns were noted during the audit, the concern for exceeding the holding times for the TCLP extraction still existed and as a result the audit rating was "Not Acceptable". The action that was recommended and subsequently taken by Alliance was that the TCLP data be flagged noting the exceedance of holding times and a stability study was to be conducted on mid-treatment samples.

The last external audit was conducted during March 1988 by PEI Associates, Inc. This Technical System Review focused on the analysis of mid-treatment samples by Alliance Technologies. The analysis being performed by Alliance were pH, oil and grease, total organic carbon, headspace volatiles, purge and trap GC/MS, and TCLP. The auditor noted that the schedule appeared adequate to meet the listed holding time requirements. The audit was given a "Satisfactory" rating. No concerns were noted and the auditor stated that "During the audit there appeared to be a very conscientious effort to track and schedule these analyses to ensure that no oversight occurred".

CALCULATION OF DATA QUALITY INDICATORS

Sampling and analytical precision was reported in terms of relative percent difference using the following equation:

$$\text{RPD} = \left| \frac{\text{Value 1 - Value 2}}{\text{Arithmetic mean of values 1 and 2}} \right| * 100$$

Accuracy assessments were based on the results of analyses of EPA Standard Reference Materials and of matrix spiked samples and reported in terms of percent recovery which was calculated as shown below:

$$\text{Percent Recovery} = 100 * \frac{\text{Measured Value}}{\text{True Value}}$$

The following formula was used to estimate completeness:

$$C = 100 * \frac{V}{T}$$

where C = Percent completeness,
V = Number of measurements judged valid, and
T = Total number of measurements.

CORRECTIVE ACTION

TCLP Sample Stability Study

Between 1 December and 15 December, 1987, Alliance field crews collected pretreatment soil samples of TCLP analyses. During this time period, a total of 103 samples were shipped to metaTRACE, Inc., Alliance's subcontract laboratory. As per the protocol specified in the QAPP, analysis for TCLP was to be conducted as described in Federal Register, Volume 51, No. 216, November 7, 1986 (pp. 40643-40653). This procedure requires that samples be extracted within 14 days of collection and analyzed within 14 days of generating the extract. Based on this requirement, all samples should have been extracted and analyzed by approximately 12 January 1988.

During the above time period, Alliance was in contact with metaTRACE on numerous occasions and had no reason to believe that analysis was not proceeding as scheduled. In fact, on 12 January 1988, Alliance was informed by metaTRACE that the chemical analysis for all 103 TCLP samples was complete and that data would be submitted to Alliance by 22 January 1988. When data did not arrive as promised, further inquiries led to the understanding on 27 January that only 39 samples had been analyzed. Apparently, metaTRACE was under the erroneous assumption that there was no holding time up to extraction and that the only holding time that applied was for analysis within 14 days after extraction. In fact, this was the case up until the TCLP procedure was revised on November 7, 1986. metaTRACE's delay in extracting the samples was due to a desire on their part to reserve a block of mass spectrometer time to allow for all samples to be analyzed within the 14 day window after extraction. metaTRACE's reporting to Alliance that all samples had been analyzed was described as an internal miscommunication within metaTRACE which led their project manager to believe that all samples had been analyzed and to subsequently report this to Alliance.

Alliance's response to the news that only 39 TCLP samples had been analyzed was to immediately gain control of the samples and thereby initiate steps to regain control of the situation as a whole. We promptly instructed metaTRACE to return all TCLP samples and took immediate steps to purchase the necessary equipment to conduct the ZHE extraction procedure for TCLP. Sixty-four unanalyzed samples arrived at Alliance on 28 January 1988. The remaining 39 samples were not received until 4 February 1988.

On Tuesday, 9 February, Alliance received a formal data package from metaTRACE accounting for only 20 samples. Communications with metaTRACE up to this point indicated that data for 39 analyses were forthcoming. On Thursday, 11 February, metaTRACE confirmed that only 22 analyses had been conducted (20 samples and two matrix spikes). Apparently, 39 samples had been extracted but at the time Alliance recalled the samples from metaTRACE, only 20 had actually been analyzed. Analysis of the remaining 19 extracts was cancelled. In addition, extraction dates reported in the metaTRACE data package showed that none of the samples had been analyzed within the 14 day holding time. At this point, Alliance made the decision to reanalyze all samples that had been analyzed by metaTRACE (where adequate sample remained) and to proceed with the analyses of all remaining samples.

Initially, it was Alliances intent to analyze a subset of samples where measureable TCLP concentrations were expected and to compare this data with metaTRACE data as a measure of negative holding time effects. Insufficient data was obtained from the initial study to make a conclusive assessment of the effect of measured TCLP holding times. It was therefore Alliance's recommendations to conduct a TCLP stability study to assess the effect. This study involved the collection of replicate samples during the Midtreatment Phase and successively analyzing three samples over a time period that covers the maximum time interval that Pretreatment TCLP samples were held.

The Stability Study involved collecting three sets of seven replicate samples during the midtreatment phases. Separate boreholes were advanced specifically for the purpose of collecting these samples. All samples were prescreened with an OVA hydrocarbon analyzer to predict the presence of organics in the soil.

Soil samples submitted for the holding time study were extracted via the TCLP leaching procedure within one week of collection for the "time zero" concentration, and subsequently at 3, 5, 7, 9, 10, and 12 weeks after collection. The "time zero" samples were prepared and analyzed in duplicate. Table 4-24 presents the concentrations of trichloroethylene found in the leachates generated during this study. Review of the data indicates that there was significant loss of trichloroethylene in Borings B1/1 and B1/2 within three weeks after collection. The mean "time zero" concentration for B1/1 and B1/2 was 4.0 mg/L. The average concentration for these two borings between weeks 3 and 12 (exclusive of the outlier in B1/2 at week 10) was 0.18 mg/L (plus or minus 54 percent). Boring B5/8 did not evidence a sufficient "time zero" concentration to provide valid data.

The data indicates that the operative mechanism of volatile losses reaches a plateau at a leachate concentration equivalent to approximately 0.2 mg/L. No conclusions concerning the identity of this mechanism (microbial degradation, volatilization, etc) can be drawn because this study was designed only to quantify the occurrence of volatile loss with time.

TABLE 4-24. RESULTS OF TCLP HOLDING TIME STUDY

	Trichloroethylene Concentration (mg/L)		
Weeks After Collection	Boring-B5/8	Boring-B1/1	Boring-B1/2
0	0.072 (a)	5.3 (a)	2.8 (a)
3	ND	0.30	0.051
5	0.38	0.27	0.26
7	ND	0.33	0.20
9	ND	0.12	0.11
10	ND	0.075	0.84 (b)
12	NA	0.067	0.17

(a) Reported result is mean of duplicate determinations.

(b) Value rejected as an outlier using Dixon's Test (see text).

ND= Not detected above the quantitation limit of 0.05 mg/L.

NA= Not analyzed.

It can be concluded that the TCLP data from the Pretreatment Phase of this program were negatively impacted by the generation of leachates after expiration of the two week holding time. Reported concentrations should be qualified as minimum values, which, in the absence of any other contributing factors except holding time, could be diminished by a factor of 100 or more.

Neither of the two valid sets of samples (B1/1 and B1/2) evidenced reduction in concentration below approximately 0.2 mg/L. Consequently, it could reasonably be assumed that any program samples reported as "ND" (Not Detected below 0.05 mg/L) would not have contained measureable concentrations in the leachate even if the holding times had not been exceeded. In order to verify this assumption, a comparison of Pretreatment purge-and-trap data with TCLP data was performed. Although the extraction efficiency of the TCLP leachate generation is unknown, there should be some correlation between concentrations of 100 to 400 mg/Kg in soil with measurable concentrations in leachates. Comparison of data from extraction Well 4 indicates a lack of correlation, thus indicating that factors other than holding times impacted the integrity of the Pretreatment TCLP samples. These factors probably include sample storage with varying amounts of headspace and repeated opening of sample containers.

QUALITY ASSURANCE REPORTS

All pertinent quality control data and activities have been summarized in this Final Report.

APPENDICES

APPENDIX A - SOIL BORINGS

APPENDIX B - DRILLERS LOGS

APPENDIX C - ENGINEERING BORINGS

APPENDIX D - SHALLOW SOIL GAS

APPENDIX E - PROCESS AND SOIL GAS

APPENDIX F - PROCESS PARAMETERS

APPENDIX G - FLOW RATES AND FLUX RATES

APPENDIX H - PROCESS AND SOIL GAS ANALYTICAL SOP's

APPENDICES SAMPLE CODES

1. Soil Borings--sample codes were assigned based on the location of sample collection. Pretreatment borings were labeled according to which treatment well was to be constructed in the borehole. Therefore, these samples are labeled as EWS (extraction well soils) or MWS (monitoring well soils). Mid and post treatment borings (B) were labelled sequentially as they were drilled. Engineering borings (EB) are simply the four locations where Shelby tube samples were collected.

MWSx/n - Monitoring Well
EWSx/n - Extraction Well
EBx/n - Engineering Boring
By/n - Boring

x = 1, 2, 3, 4
n = 1-12, represents 2 ft. intervals
y = 1-4, 6-13

2. Soil and Process Gas--sample codes were assigned based on sample location along the system. During the first week of active treatment, samples were collected twice per day at extraction Well #1 (shallow and deep) resulting in the following codes: EWGIS/1; EWGIS/2; EWGID/1; and EWGID/2. Generally, all other points were sampled on their scheduled sample day once per day (the exception being the primary carbon which on occassion was sampled more than once per day). During pre, mid, and post treatment punch bar (PB) samples were collected around extraction Well #1 to characterize the shallow soil vapor concentration:

EWGxS/1 - Extraction Wells
VMWGxS/1 - Vacuum Monitoring Wells
EWGxD/1 - Extraction Wells
VMWGxD/1 - Vacuum Monitoring Wells
PBn - Punch Bar
PG SepIn - Process gas, separator inlet
PG CarbOut - Process gas, primary carbon outlet
PG Second - Process gas, secondary carbon outlet
PG Stout - Process gas, stack outlet

x = 1, 2, 3, 4
n = 1-12
S = shallow
D = deep

3. Background and QA samples - codes were assigned based on location of sample collection:

Background System Samples Collected Before Operations:

BKG 1 Carb - primary carbon
BKG 2 Carb - secondary carbon
BKG SepIn - separator inlet
BKG Sepout - separator outlet
BKG Vac Out - stack outlet

QA Sampler

GTV-BL - GTVFBB - Fieldblank - FBB -	Field biased blanks - sample consisted of ambient air drawn into a syringe from a point onsite generally in the area of the extraction wells.
GLamb -	Groveland onsite laboratory ambient, sample collected inside the laboratory
Tripblank -	Sample of pure nitrogen collected in the laboratory before field sample collection. This sample was then carried into the field and handled in the same manner as the process samples collected that day.

APPENDIX A

SOIL BORINGS

SOIL BORINGS

The various quantitation limits for GC/MS purge and trap, TCLP extracts and GC soil headspace, respectively, for pre, mid, and post treatment are as follows:

GC/MS Purge and Trap

The quantitation limit varies depending on the individual sample weight and moisture content. The typical range observed for the three phases of the program are:

Pretreatment	0.94-2.4 mg/kg
Midtreatment	1.2-2.0 mg/kg
Post treatment	1.1-1.6 mg/kg

GC/MS TCLP Extracts

The Quantitation limit observed was the same for all three phases of the program.

Pretreatment	0.05 mg/L
Midtreatment	0.05 mg/L
Post treatment	0.05 mg/L

GC Soil Headspace

The quantitation limit varies depending on the individual sample weight and moisture content. The typical ranges observed for the three phases of the program are as follows:

			(mg/kg)		
	MeCl	DCE	TRI	TCE	PCE
Pretreatment	(1.40-4.44)	(1.12-3.53)	(1.40-4.44)	(1.40-4.44)	(1.40-4.44)
Midtreatment	(0.79-2.07)	(1.58-4.10)	(7.99-20.7)	(7.99-20.7)	(7.99-20.7)
Post treatment	(1.30-3.24)	(0.65-1.63)	(0.87-2.16)	(0.68-1.69)	(1.29-3.22)

Oil and Grease

The quantitation limit varies with individual weight and moisture content. Values labeled as "less than" are at or below the quantitation limit.

The following codes are used on these tables:

ND = Not detected.
TRACE = Detected below quantification limit.
NR = No recovery; no samples collected or limited samples collected.
(B) = Suspected laboratory or field contamination.

APPENDIX B

DRILLERS LOGS

ALLIANCE
Technologies Corporation

EW #1

TEST BORING LOG
BORING NO.

PROJECT : 7531002
CLIENT : Enviresponse
BORING CONTRACTOR : NE Boring
SHEET NO 1 OF 1
JOB NO
ELEVATION
DATE STARTED 12-10-87
DATE FINISHED 12-10-87
DRILLER T. Carpenter
INSPECTOR K. Scully
JT

GROUND WATER

DATE	TIME	WATER EL.	SCREEN		CAS	SAMP	CORE	TUBE
				TYPE				
				DIA				
				WT.				
				FALL				

DEPTH	# Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From - To 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE OVA	Pen	Rec
	1	0-2'	SS	2	2	3		Sand	Soft lt brn sand w/ some organics	0		2
						3						
	2	2-4		3	3	3			Soft lt brn fine sand w/ some discoloration	10		2
						3						
5	3	4-6		3	3	2			M stiff grey fine sand and silt, V stiff lt brn fine sand	200		5
						2						
	4	6-8		3	6	13			V stiff grn-brn clay w/ trace silt	400		10
	5	8-10		15	18	19				250		18
10						23						
	6	10-12		20	36	33				200		16
						11						
	7	12-14		12	22	30				60		24
						23	14'					
15	8	14-16		9	12	15		Clay	Stiff grey green silty clay	30		22
						15	16'					
	9	16-18		12	18	28		Sand & Gravel	V stiff med-coarse brn sand w/ some rock frags	30		18
						38						
20	10	18-20		21	25	21			V stiff lt brn med sand	0		20
						84						
	11	20-22		92	24	22				0		10
						20						
	12	22-24	SS	27	15	18				10		24
						19						
25									B.O.B. @ 24' No Water			

GROUND SURFACE TO ________ USED ________ " CASING: THEN ________

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY
Earth Boring ________
Rock Coring ________
Samples ________

HOLE NO.

TOWN PRESS — EAST PROV.

ALLIANCE
Technologies Corporation

EW #2

TEST BORING LOG	
BORING NO. 2	
SHEET NO 1 OF 1	
JOB NO	
ELEVATION	
DATE STARTED	12-7-87
DATE FINISHED	12-7-87
DRILLER	T. Carpenter
INSPECTOR	K. Scully
JT	

PROJECT : 7531002
CLIENT : Enviresponse
BORING CONTRACTOR : NE Boring
GROUND WATER

DATE	TIME	WATER EL	SCREEN		CAS	SAMP	CORE	TUBE
				TYPE				
				DIA				
				WT.				
				FALL				

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6 on Sampler 0-6	6-12	12-18	Moisture Density or Consist.	Strata Change Etc.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE OVA	Pen	Rec
	1	0-2	SS	5	6	7			M stiff brn med sand w/			18
						7			some organic soil & wood			
	2	2-4		5	3	5			chips			12
						6		Sand	Soft lt brn fine sand			
5									M stiff dk brn fine sand			
	3	4-6		6	4	2			w/ rock frags			14
						3			Soft dk brn - lt brn fine			
	4	6-8		4	4	3			sand - stiff dk brn sand,			22
						3			soft lt brn fine sand			
10	5	8-10		6	7	9			V stiff lt brn fine sand			24
						12						
	6	10-12		13	14	17						18
						25						
	7	12-14		28	12	13						1
						8						
15	8	14-16		5	7	7	15'	Clay	Stiff grey green silty clay			24
						10						
	9	16-18		10	10	11	18'		V stiff med-coarse brn sand			24
						16			w/ some rock frags			
20	10	18-20		20	18	13		Sand & Gravel	V stiff lt brn med sand			14
						12						
	11	20-22		13	14	18						14
						24						
	12	22-24	SS	18	14	14						14
						20						
25												
									B.O.B. @ 24' No Water			

GROUND SURFACE TO ______ USED ______ CASING: THEN ______

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med. Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY
Earth Boring ______
Rock Coring ______
Samples ______

HOLE NO

TOWN PRESS — EAST PROV.

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Technologies Corporation

EW #3

TEST BORING LOG
BORING NO.

SHEET NO 1 OF 1	
JOB NO	
ELEVATION	
DATE STARTED	12-8-87
DATE FINISHED	12-8-87
DRILLER	T. Carpenter
INSPECTOR	K. Scully
	JT

PROJECT : 7531002
CLIENT : Enviresponse
BORING CONTRACTOR : NE Boring
GROUND WATER

DATE	TIME	WATER EL	SCREEN		CAS	SAMP	CORE	TUBE
				TYPE				
				DIA				
				WT				
				FALL				

DEPTH	Casing Blows per foot	#	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Etc.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE OVA	Pen	Rec
		1	0-2	SS	1	6	7 6		Sand	M stiff brn med sand w/ some dk organic soil	50		14
		2	2-4		4	3	2 2			Sft med brn sand w/ some gravel	150		3
5		3	4-6		6	6	3 3			M stiff lt brn sand	0		21
		4	6-8		2	2	2 4			Soft lt brn fine sand, trace silt, w/ some med-coarse sand	0		18
		5	8-10		2	4	4 8			V stiff lt brn sand	0		15
10		6	10-12		8	9	13 24			M stiff lt brn med sand	10		18
		7	12-14		12	18	20 28				0		16
15		8	14-16		8	8	15 18	15'	Silty clay	V stiff grn-brn silty clay w/ sand stringer	0		20
		9	16-18		16	17	20 18				0		24
20			18-20		28	20	24 29	18'	Sand & Gravel	V stiff med sand w/ rock frags & gravel	0		20
		11	20-22		28	20	24 29			V stiff med-coarse brn sand w/ some gravel	0		15
		12	22-24	SS	42	60	88				0		14
25										B.O.B. @ 23.5 No Water			

GROUND SURFACE TO ________ USED ________ CASING: THEN ________

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density	
0-10	Loose
10-30	Med. Dense
30-50	Dense
50 +	Very Dense

Cohesive Consistency	
0-4	Soft
4-8	M/Stiff
8-15	Stiff
15-30	V-Stiff
30 +	Hard

SUMMARY
Earth Boring ________
Rock Coring ________
Samples ________

HOLE NO

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EW #4

TEST BORING LOG
BORING NO.
SHEET NO 1 OF 1
JOB NO
ELEVATION
DATE STARTED 12-9-87
DATE FINISHED 12-9-87
DRILLER T. Carpenter
INSPECTOR K. Scully
JT

PROJECT : 7531002
CLIENT : Enviresponse
BORING CONTRACTOR : NE Boring
GROUND WATER

DATE	TIME	WATER EL.	SCREEN		CAS	SAMP	CORE	TUBE
				TYPE				
				DIA				
				WT				
				FALL				

DEPTH	Casing # Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler 0-6	6-12	12-18	Moisture Density or Consist.	Strata Change Etc.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE OVA	Rec
	1	0-2'	SS	3	4	6 4		Sand	Soft brn med sand w/ some gravel	10	15
	2	2-4		3	2	2 4			Soft lt brn fine sand M stiff lt brn fine sand w/ some discoloration	100	18
5	3	4-6		5	5	6 3			Soft dk brn fine sand M stiff brn sand	500	15
	4	6-8		3	2	3 3			V stiff lt brn med sand	500	15
10	5	8-10		5	6	9 20			V stiff brn fine sand w/ some silt	1000	18
	6	10-12		14	15	20 27				500	18
	7	12-14		19	17	15 18				300	21
15	8	14-16		9	7	6 8		Clay	M stiff grn-brn clay w/ some silt	30	20
	9	16-18		4	5	6 6			Soft wet clay	15	24
20	10	18-20		3	3	4 4				0	24
	11	20-22		3	4	16 17		Sand & Gravel	V stiff brn med-coarse sand & gravel	10	23
	12	22-24	SS	36	36	40 42				10	14
25											

B.O.B. @ 24' No Water

GROUND SURFACE TO ______ USED ______ CASING: THEN ______

140lb Wt. x 30" fall on 2" O.D. Sampler

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

Cohesionless Density	
0-10	Loose
10-30	Med Dense
30-50	Dense
50 +	Very Dense

Cohesive Consistency	
0-4	Soft
4-8	M/Stiff
8-15	Stiff
15-30	V-Stiff
30 +	Hard

SUMMARY:
Earth Boring ______
Rock Coring ______
Samples ______

HOLE NO.

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MW #1

TEST BORING LOG
BORING NO. 1

PROJECT : 7531002
CLIENT : Enviresponse
BORING CONTRACTOR : NE Boring
GROUND WATER

SHEET NO 1 OF 1
JOB NO
ELEVATION
DATE STARTED 12-1-87
DATE FINISHED 12-2-87
DRILLER T. Carpenter
INSPECTOR K. Scully
JT

DATE	TIME	WATER EL	SCREEN		CAS	SAMP	CORE	TUBE
				TYPE				
				DIA				
				WT				
				FALL				

DEPTH	Casing # Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	OVA	Pen	Rec
	1	0-2'	SS	1	2	1			Soft dk brn silt & fine			11
						2			sand w/ some organics			
	2	2-4		6	9	18			Stiff dk brn silt w/ some			11
						12		Silty	fine sand			
								Sand	Soft dk brn silt w/ fine			
5	3	4-6		1	1	2			sand - soft lt brn fine			14
						1			sand			
	4	6-8		3	5	5						20
						9						
	5	8-10		4	3	5						20
10						5	10'					
	6	10-12		8	12	13		Clay	Med stiff brn-grn clay			18
						16						
							14'					
	7	12-14		4	4	8						20
15								Sand	Stiff lt brn fine sand w/			
	8	14-16		9	22	24		&	some clay, some gravel			20
						25		Gravel	Stiff brn med sand w/ some			
	9	16-18		8	12	14			gravel			20
						26						
	10	18-20		10	10	11						18
20						14	20'					
	11	20-22		12	15	11		Clay	Stiff grey-green clay			6
						13	22'					
	12	22-24		11	15	19		Sand	Brn med sand			18
						22			Brn fine sand			
25	13	24-26	SS	11	12	16						24
						20						
									B.O.B. @ 26' No Water			

GROUND SURFACE TO ____________ USED ________ CASING: THEN ____________

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY
Earth Boring ______
Rock Coring ______
Samples ______

HOLE NO

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MW #2

TEST BORING LOG
BORING NO.

PROJECT : 7531002
CLIENT : Enviresponse
BORING CONTRACTOR : NE Boring
GROUND WATER

				CAS	SAMP	CORE	TUBE
DATE	TIME	WATER EL	SCREEN	TYPE			
				DIA			
				WT.			
				FALL			

SHEET NO 1 OF 1
JOB NO
ELEVATION
DATE STARTED 12-8-87
DATE FINISHED 12-9-87
DRILLER T. Carpenter
INSPECTOR K. Scully
JT

DEPTH	# Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Etc.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE Pen	Rec
	1	0-2'	SS	1	2	3			Soft lt brn sand	0	15
						4			Med fine sand w/ some gravel,		
	2	2-4		5	4	4		Sand	some organic soil	300	3
						5			Soft brn fine sand		
									M-V stiff brn fine sand		
5	3	4-6		3	3	3			Stiff lt brn fine sand	400	15
						3			Stiff dk brn fine sand		
	4	6-8		3	4	7				800	15
						9					
	5	8-10		13	19	35				1500	22
10						37					
	6	10-12		12	19	21				0	15
						8					
	7	12-14		10	12	12	14'			0	24
						13					
15	8	14-16		4	7	9		Clay	V stiff grey-brn clay w/ some silt	90	19
						9					
	9	16-18		19	30	21	17'	Sand & Gravel	V stiff brn med-coarse sand w/ some gravel	400	18
						29					
	10	18-20		16	19	27			V stiff lt brn & brn med sand	0	20
20						33					
	11	20-22		27	14	15				20	18
						15					
	12	22-24	SS	13	12	13				15	18
25						15			B.O.B. @ 24' No Water		

GROUND SURFACE TO ______ USED ______ CASING: THEN ______

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY:
Earth Boring ______
Rock Coring ______
Samples ______

HOLE NO

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MW #3

TEST BORING LOG
BORING NO.

PROJECT : 7531002	SHEET NO 1 OF 1
CLIENT : Enviresponse	JOB NO
BORING CONTRACTOR : NE Boring	ELEVATION
GROUND WATER	DATE STARTED 12-11-87
	DATE FINISHED 12-11-87
	DRILLER T. Carpenter
	INSPECTOR K. Scully
	JT

DATE	TIME	WATER EL	SCREEN		CAS	SAMP	CORE	TUBE
				TYPE				
				DIA				
				WT				
				FALL				

DEPTH	Casing Blows per foot / #	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler			Moisture Density or Consist	Strata Change Etc.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE OVA	Rec
	1	0-2'	SS	1	6	12		Sand	M stiff brn fine sand w/ some rock frags	0	4
						12					
	2	2-4		10	19	11			M stiff grey fine sand	10	14
						12			Soft brn fine sand w/ trace silt		
5	3	4-6		8	3	6			Soft lt brn fine sand	100	18
						2					
	4	6-8		4	4	4				100	24
						4					
	5	8-10		6	5	4				300	14
10						4					
	6	10-12		1	0	0			- No Recovery -	0	0
						0					
	7	12-14		1	0	0	14'		Soft brn silt	50	14
						1					
15	8	14-16		1	0	0		Wet Clay	Wet grn-brn silty clay	50	14
						0					
	9	16-18		1	0	0				100	10
						0					
	10	18-20		1	1	1	20'			100	12
20						2					
	11	20-22		1	0	1		Sand & Gravel	Silt, some gravel & rock frags	150	8
						1			M stiff lt brn med sand		
	12	22-24	SS	1	3	8				50	8
						9					
25									B.O.B. @ 24' No Water		

GROUND SURFACE TO ______ USED ______ CASING: THEN ______

140 lb Wt. x 30" fall on 2" O.D. Sampler

Sample Type	Proportions Used		Cohesionless Density		Cohesive Consistency	
D=Dry C=Cored W=Washed	trace	0 to 10%	0-10	Loose	0-4	Soft
UP=Undisturbed Piston	little	10 to 20%	10-30	Med Dense	4-8	M/Stiff
TP=Test Pit A=Auger V=Vane Test	some	20 to 35%	30-50	Dense	8-15	Stiff
UT=Undisturbed Thinwall	and	35 to 50%	50 +	Very Dense	15-30	V-Stiff
					30 +	Hard

SUMMARY
Earth Boring ______
Rock Coring ______
Samples ______

HOLE NO

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MW #4

TEST BORING LOG
BORING NO.

PROJECT : 7531002	SHEET NO 1 OF 1
CLIENT : Enviresponse	JOB NO
BORING CONTRACTOR : NE Boring	ELEVATION
GROUND WATER	DATE STARTED 12-14-87
	DATE FINISHED 12-14-87
	DRILLER T. Carpenter
	INSPECTOR K. Scully
	JT

GROUND WATER DATE	TIME	WATER EL	SCREEN		CAS	SAMP	CORE	TUBE
				TYPE				
				DIA				
				WT				
				FALL				

DEPTH	# Casing Blows per foot	Sample Depths From – To	Type of Sample	Blows per 6" on Sampler From – To 0-6	6-12	12-18	Moisture Density or Consist.	Strata Change Etc.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE OVA	Pen	Rec
	1	0-2'	SS	1	2	2		Sand	Soft dk brn fine sand w/ some organic soil	0		19
						2						
	2	2-4		1	2	1			Soft lt brn med fine sand trace silt	40		16
						2						
5									Soft lt brn fine sand			
	3	4-6		2	2	3			Med stiff brn fine sand	75		12
						3			Stiff lt brn med-coarse sand w/ some gravel			
	4	6-8		3	5	7				100		16
						8						
10	5	8-10		11	16	22				200		16
						21						
	6	10-12		10	5	6				40		15
						7						
	7	12-14		6	6	7		Clay	Stiff grn-brn clay w/ trace silt	30		24
						11						
15	8	14-16		16	25	28		Sand & Gravel		10		20
						33			V stiff brn med-coarse sand & gravel			
	9	16-18		14	20	16				10		15
						14			V stiff lt brn med sand			
20	10	18-20		19	12	13				10		18
						14						
	11	20-22		8	10	10				15		18
						10			B.O.B. @ 24' No Water			
	12	22-24	SS	17	12	13				5		20
						15						
25												

GROUND SURFACE TO ____________ USED ____________ CASING: THEN ____________

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY
Earth Boring ______
Rock Coring ______
Samples ______

HOLE NO.

TOWN PRESS – EAST PROV.

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NEW ENGLAND BORING CONTRACTOR OF CT. INC.
109 COMMERCE STREET
GLASTONBURY, CT 06033
(203) 633-4649 — (413) 733-1232

CLIENT Alliance Tech
PROJECT NAME Groveland Wells
LOCATION Groveland, MA

BORING NUMBER B-1
SHEET No. 1 of 1

DRILLER T. Roe
INSPECTOR J. Thomas
DATE START 3/14/88
DATE FINISH 3/15/88

ARCHITECT ENGINEER

	Casing	Sampler	Core Barrel
TYPE	HSA	SS	
SIZE I D	2-1/2"	1-3/8"	
HAMMER WT		140	
HAMMER FALL		30"	

FILE NO.
SURFACE ELEV
LINE & STATION
OFFSET

DEPTH	SAMPLE						COL A	STRATA CHANGE	FIELD CLASSIFICATION AND REMARKS
	NO.	DEPTH RANGE	BLOWS PER 6" ON SAMPLER			REC			
			0-6	6-12	12-18				
	S1	0.0-2.0	3	4					Br.-Dark Br. Fine-Med. Sand, Tr. Crs. Sand, Gravel, Silt
				4	5	12"			
	S2	2.0-4.0	6	12					
				7	8	6"			
5'	S3	4.0-6.0	5	3					
				2	3	14"		6.0	
	S4	6.0-8.0	4	3					Light Br. Fine Sand, Tr. Gravel
				3	4	10"			
	S5	8.0-10.0	2	4					
10'				6	8	22"			
	S6	10.0-12.0	7	17					
				12	7	14"		12.0	
	S7	12.0-14.0	3	6					Grey Green Clay
				7	9	18"			
15'	S8	14.0-16.0	3	4					
				5	5	20"			
	S9	16.0-18.0	3	12				17.0	
				17	19	20"			Grey Br. Fine Sand, Little Med.-Crs. Sand, Tr. Gravel, Silt
	S10	18.0-20.0	9	13					
20'				13	14	16"			
	S11	20.0-22.0	8	12					
				8	9	16"			
	S12	22.0-24.0	5	7					
				9	10	17"		24.0	
25'									Bottom of Boring 24.0 No Water Sealed Hole with one Bucket Bentonite Pellets

NOTES
1) The stratification lines represent the approximate boundary between soil types; transitions may be gradual.
2) Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. Fluctuations in the level of groundwater may occur due to other factors than those present at the time measurements were made.

SAMPLE PENETRATION RESISTANCE
140 lb Wt falling 30" on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-4	Very Loose	0-2	Very Soft
5-9	Loose	3-4	Soft
10-29	Med. Dense	5-8	M/Stiff
30-49	Dense	9-15	Stiff
50 +	Very Dense	16-30	V-Stiff
		31 +	Hard

PROPORTIONS

trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

REMARKS

COL. A

NEW ENGLAND BORING CONTRACTOR OF CT. INC.
109 COMMERCE STREET
GLASTONBURY, CT 06033
(203) 633-4649 — (413) 733-1232

CLIENT Alliance Tech
PROJECT NAME Groveland Wells
LOCATION Groveland, MA

BORING NUMBER B-2
SHEET No. 1 of 1

DRILLER T. Roe
INSPECTOR J. Thomas
DATE START 3/15/88
DATE FINISH 3/15/88

ARCHITECT ENGINEER

	Casing	Sampler	Core Barrel
TYPE	HSA	SS	
SIZE I D	2-1/2"	1-3/8"	
HAMMER WT		140	
HAMMER FALL		30"	

FILE NO.
SURFACE ELEV.
LINE & STATION
OFFSET

DEPTH	SAMPLE						COL. A	STRATA CHANGE	FIELD CLASSIFICATION AND REMARKS
	NO.	DEPTH RANGE	BLOWS PER 6" ON SAMPLER			REC			
			0-6	6-12	12-18				
	S1	0.0-2.0	1	4					Light Br. Fine Sand, Tr. Silt
				4	4	14"		3.0	
	S2	2.0-4.0	6	5					
				5	6	24"			
5'	S3	4.0-6.0	9	4					
				4	3	20"			
	S4	6.0-8.0	2	3					
				3	3	24"			
	S5	8.0-10.0	2	5					
10'				7	9	18"			
	S6	10.0-12.0	7	13					Dark Br. Fine Sand, Some Silt, Tr. Med.-Crs. Sand, Gravel (Cinders @ 6.0)
				12	10	24"			
	S7	12.0-14.0	5	6					
				6	7	20"		15.0	
15'	S8	14.0-16.0	4	4					
				8	9	18"			Grey Green Clay
	S9	16.0-18.0	3	5					
				7	8	20"		19.0	
	S10	18.0-20.0	3	5					
20'				9	21	20"			Br. Fine-Crs. Sand, Little Gravel, Tr. Silt
	S11	20.0-22.0	9	16					
				13	11	16"			
	S12	22.0-24.0	8	8					
				8	9	16"		24.0	
25'									Bottom of Boring 24.0 No Water Sealed Hole with one Bucket Bentonite Pellets

NOTES
1) The stratification lines represent the approximate boundary between soil types, transitions may be gradual.
2) Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. Fluctuations in the level of groundwater may occur due to other factors than those present at the time measurements were made.

SAMPLE PENETRATION RESISTANCE
140 lb Wt falling 30" on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-4	Very Loose	0-2	Very Soft
5-9	Loose	3-4	Soft
10-29	Med. Dense	5-8	M/Stiff
30-49	Dense	9-15	Stiff
50 +	Very Dense	16-30	V-Stiff
		31 +	Hard

PROPORTIONS

trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

REMARKS:

COL A

NEW ENGLAND BORING CONTRACTOR OF CT. INC.
109 COMMERCE STREET
GLASTONBURY, CT 06033
(203) 633-4649 — (413) 733-1232

CLIENT Alliance Tech.
PROJECT NAME Groveland Wells
LOCATION Groveland, MA

BORING NUMBER B-3
SHEET No. 1 of 1

DRILLER T. Roe
INSPECTOR J. Thomas
DATE START 3/15/88
DATE FINISH 3/15/88

ARCHITECT ENGINEER

	Casing	Sampler	Core Barrel
TYPE	HSA	SS	
SIZE I.D.	2-1/2"	1-3/8"	
HAMMER WT		140	
HAMMER FALL		30"	

FILE NO
SURFACE ELEV
LINE & STATION
OFFSET

DEPTH	SAMPLE NO.	SAMPLE DEPTH RANGE	BLOWS PER 6 ON SAMPLER 0-6	6-12	12-18	REC	COL A	STRATA CHANGE	FIELD CLASSIFICATION AND REMARKS
	S1	0.0-2.0	2	3					Br. Dark Br. Fine-Med. Sand, Tr. Crs. Sand, Gravel, Silt (Possible Fill)
				2	3	10"			
	S2	2.0-4.0	3	3				3.0	
				2	2	20"			Light Br. Fine-Med. Sand, Some Silt
5'	S3	4.0-6.0	2	2					
				1	2	18"			
	S4	6.0-8.0	2	5					
				7	9	20"			
	S5	8.0-10.0	4	2					
10'				7	9	18"		10.0	
	S6	10.0-12.0	4	7					Grey Green Clay, Tr. Gravel
				11	16	18"			
	S7	12.0-14.0	4	9					
				17	26	14"		14.0	
15'	S8	14.0-16.0	8	11					Br. Fine-Med. Sand, Little Crs. Sand, Tr. Gravel
				11	11	18"			
	S9	16.0-18.0	4	6					
				9	8	20"			
	S10	18.0-20.0	6	8					
20'				7	8	20"			
	S11	20.0-22.0	4	6					
				7	9	20"			
	S12	22.0-24.0	4	6					
				7	10	22"		24.0	
25'									Bottom of Boring 24.0 No Water Sealed Hole with one bucket Bentonite Pellets

NOTES: 1) The stratification lines represent the approximate boundary between soil types, transitions may be gradual.
2) Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. Fluctuations in the level of groundwater may occur due to other factors than those present at the time measurements were made.

SAMPLE PENETRATION RESISTANCE
140 lb Wt falling 30" on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-4	Very Loose	0-2	Very Soft
5-9	Loose	3-4	Soft
10-29	Med. Dense	5-8	M. Stiff
30-49	Dense	9-15	Stiff
50 +	Very Dense	16-30	V-Stiff
		31 +	Hard

PROPORTIONS

trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

REMARKS:

COL. A

NEW ENGLAND BORING CONTRACTOR OF CT. INC.
109 COMMERCE STREET
GLASTONBURY, CT 06033
(203) 633-4649 — (413) 733-1232

CLIENT Alliance Tech.
PROJECT NAME Groveland Wells
LOCATION Groveland, MA

BORING NUMBER B-4
SHEET No. 1 of 1

DRILLER T. Roe
INSPECTOR J. Thomas
DATE START 3/16/88
DATE FINISH 3/16/88

ARCHITECT ENGINEER

	Casing	Sampler	Core Barrel
TYPE	HSA	SS	
SIZE I.D.	2-1/2"	1-3/8"	
HAMMER WT.		140	
HAMMER FALL		30"	

FILE NO.
SURFACE ELEV.
LINE & STATION
OFFSET

DEPTH	SAMPLE NO.	SAMPLE DEPTH RANGE	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	REC	COL A	STRATA CHANGE	FIELD CLASSIFICATION AND REMARKS
	S1	0.0-2.0	3	3					Light Br. Med.-Crs. Sand
				2	2	12"			
	S2	2.0-4.0	2	0					
				1	2	16"		4.0	
5'	S3	4.0-6.0	2	2					Light Br. Fine-Med. Sand, Some Silt
				1	2	24"			
	S4	6.0-8.0	2	4					
				7	12	24"			
	S5	8.0-10.0	7	11					
10'				6	5	16"		10.0	
	S6	10.0-12.0	3	6					Grey Green Clay
				9	15	18"			
	S7	12.0-14.0	4	6					
				8	27	18"		14.0	
15'	S8	14.0-16.0	12	15					Br. Fine-Crs. Sand, Some Gravel
				12	12	18"		16.0	
	S9	16.0-18.0	7	10					Light Br. Fine-Med. Sand, Some Silt, Little Crs. Sand
				12	16	20"			
	S10	18.0-20.0	5	8					
20'				9	11	20"			
	S11	20.0-22.0	4	6					
				6	7	18"			
	S12	22.0-24.0	4	6					
				6	7	20"		24.0	
25'									Bottom of Boring 24.0 No Water Sealed Hole with one bucket Bentonite Pellets

NOTES 1) The stratification lines represent the approximate boundary between soil types, transitions may be gradual.
2) Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. Fluctuations in the level of groundwater may occur due to other factors than those present at the time measurements were made.

SAMPLE PENETRATION RESISTANCE
140 lb. Wt. falling 30" on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-4	Very Loose	0-2	Very Soft
5-9	Loose	3-4	Soft
10-29	Med. Dense	5-8	M. Stiff
30-49	Dense	9-15	Stiff
50 +	Very Dense	16-30	V. Stiff
		31 +	Hard

PROPORTIONS

trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

REMARKS

COL. A

ALLIANCE
Technologies Corporation

Boring #6
. adj. to EW #2

TEST BORING LOG

BORING NO.
SHEET NO 1 OF 1
JOB NO
ELEVATION
DATE STARTED 4-19-87
DATE FINISHED 4-19-87
DRILLER Bob P.
INSPECTOR J. Thomas

PROJECT : 7531002
CLIENT : Enviresponse
BORING CONTRACTOR : Hydro Group
GROUND WATER -

DATE	TIME	WATER EL	SCREEN		CAS	SAMP	CORE	TUBE
				TYPE				
				DIA				
				WT.				
				FALL				

DEPTH	Casing #Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE OVA	Pen	Rec
	1	0-2	SS	5	2	27			Stiff brn - lt brn sand	0		5
						10			Med grn w/ some silt & organics, rock frags	0		12
	2	2-4		2	3	4			6-8' - No recovery	30		5
						6			Rock on spoon month			
	3	4-6		6	6	9			Stiff lt brn sand	-		0
5						14			Med-fine grained silty sand, some gravel			
	4	6-8		8	16	20			12-14' - No recovery			
						23				5		22
	5	8-10		14	23	23				5		12
10						27						
	6	10-12		13	30	40				-		0
						30						
	7	12-14		37	10	6/8				5		4
15	8	14-16		8	10	45	16'	Silty Clay	Stiff grey-green silty clay	15		15
						20						
	9	16-18		9	13	22				35		18
						27						
	10	18-20		17	22	22	19'	Sand & Gravel	Brn sand & gravel	10		6
20						22			Med-coarse grn			
	11	20-22		2	4	6				5		12
						12						
	12	22-24	SS	15	25	25						
						33			B.O.B. @ 24' No Water			
25												

GROUND SURFACE TO ________ USED ________ CASING: THEN ________

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med. Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY
Earth Boring ______
Rock Coring ______
Samples ______
HOLE NO.

TOWN PRESS — EAST PROV.

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ALLIANCE
Technologies Corporation

Boring #7
. adj. to EW #3

TEST BORING LOG

BORING NO.

PROJECT : 7531002				SHEET NO 1 OF 1
CLIENT : Enviresponse				JOB NO
BORING CONTRACTOR : Hydro Group				ELEVATION
GROUND WATER			CAS | SAMP | CORE | TUBE	DATE STARTED 4-19-88
DATE | TIME | WATER EL	SCREEN		TYPE	DATE FINISHED 4-20-88
			DIA	DRILLER Bob P.
			WT	INSPECTOR J. Thomas
			FALL	

DEPTH	Casing # Blows per foot	Sample Depths From – To	Type of Sample	Blows per 6" on Sample			Moisture Density or Consist.	Strata Change Etc.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE		
				0-6	6-12	12-18				OVA	Pen	Rec
	1	0-2'	SS	2	3	11			Stiff brn sand w/ some blk organic soil	0		10
						9						
	2	2-4		30	17	5		Sand	Coarse med lt brn sand & some gravel	100		6
						6						
5	3	4-6		4	5	10			Med stiff lt brn fine sand w/ some silt	100		15
						11						
	4	6-8		6	7	12			- Some Cynders -	75		12
						16						
	5	8-10		5	16	17			Lt brn med-fine sand w/ some silt	60		16
10						21						
	6	10-12		4	11	24				75		14
						40						
	7	12-14		18	29	35				250		13
						45						
15	8	14-16		10	15	21	16'	Gravel	Fine-med sand, some silt, some coarse gravel	30		22
						26						
	9	16-18		3	5	13		Silty Clay	Stiff silty grey-green clay	0		22
						23	19'					
20	10	18-20		7	11	12		Sand & Gravel	Lt brn - brn, fine-med sand w/ some gravel	20		24
						26						
	11	20-22		11	22	38			Med-coarse sand w/ some gravel	0		24
						61						
	12	22-24	SS	23	50	66				5		12
						100	w/ 2" left					
25									B.O.B. @ 24' No Water			

GROUND SURFACE TO ______ USED ______ CASING: THEN ______

Sample Type	Proportions Used		140 lb Wt. x 30" fall on 2" O.D. Sampler				SUMMARY
			Cohesionless Density		Cohesive Consistency		
D=Dry C=Cored W=Washed	trace	0 to 10%	0-10	Loose	0-4 Soft	30 + Hard	Earth Boring ______
UP=Undisturbed Piston	little	10 to 20%	10-30	Med. Dense	4-8 M/Stiff		Rock Coring ______
TP=Test Pit A=Auger V=Vane Test	some	20 to 35%	30-50	Dense	8-15 Stiff		Samples ______
UT=Undisturbed Thinwall	and	35 to 50%	50 +	Very Dense	15-30 V-Stiff		HOLE NO.

TOWN PRESS — EAST PROV.

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ALLIANCE
Technologies Corporation

Boring #8
adj. to MW #2

TEST BORING LOG
BORING NO.

SHEET NO 1 OF 1
JOB NO
ELEVATION
DATE STARTED 4-20-88
DATE FINISHED 4-20-88
DRILLER Bob P.
INSPECTOR J. Thomas

PROJECT : 7531002
CLIENT : Enviresponse
BORING CONTRACTOR : Hydro Group
GROUND WATER

DATE	TIME	WATER EL	SCREEN		CAS	SAMP	CORE	TUBE
				TYPE				
				DIA				
				WT.				
				FALL				

DEPTH	Casing Blows per foot #	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 2-18	Moisture Density or Consist	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE OVA	Pen	Rec
	1	0-2	SS	4	6	5 5		Sand	Soft lt brn fine-med sand w/ some silt	0		10
	2	2-4		7	7	10 15			Dk brn fine blk organic soil	100		10
5	3	4-6		8	8	9 10			4-6' No Recovery	0		0
	4	6-8		7	9	9 11			M stiff fine lt brn sand well sorted some silt	0		10
	5	8-10		10	13	17 24			V fine grn, lt brn silty sand.	20		18
10	6	10-12		17	23	40 41				10		24
	7	12-14		14	29	50 54				5		18
15	8	14-16		6	14	15 23	15'	Silty Clay	Stiff grey grn silty clay Varied clays	100		24
	9	16-18		4	11	13 17				0		10
20	10	18-20		9	22	20 20	18'	Sand & Gravel	Coarse sand and gravel, brn - lt brn w/ some fine sand & silt	10		15
	11	20-22		10	20	20 21			Med-coarse well sorted brn sand	0		15
	12	22-24	SS	15	24	30 25				0		13
25									B.O.B. @ 24' No Water			

GROUND SURFACE TO ______ USED ______ CASING: THEN ______

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY
Earth Boring ______
Rock Coring ______
Samples ______

HOLE NO.

TOWN PRESS — EAST PROV.

ALLIANCE
Technologies Corporation

Boring #9
adj. to EW #1

TEST BORING LOG
BORING NO.

SHEET NO 1 OF 1
JOB NO
ELEVATION
DATE STARTED 4-21-88
DATE FINISHED 4-21-88
DRILLER Bob P
INSPECTOR J. Thomas

PROJECT : 7531002
CLIENT : Enviresponse
BORING CONTRACTOR : Hydro Group
GROUND WATER

DATE	TIME	WATER EL	SCREEN		CAS	SAMP	CORE	TUBE
				TYPE				
				DIA				
				WT				
				FALL				

DEPTH	Casing # ~~Blows per foot~~	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From To 0-6	6-12	12-18	~~Moisture Density or Consist~~	Strata Change Etc.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE OVA	Pen	Rec
	1	0-2	SS	3	3	3 4		Sand	Soft med-fine silty lt brn sand w/ dk organic soil & wood chips. Dk coarse sands, some cynders	0		15
	2	2-4		4	4	6 12				50		13
5	3	4-6		10	9	8 10			Brn fine-med sand, some silt, cynders & organic soil	5		9
	4	6-8		6	8	10 8				20		22
10	5	8-10		5	9	13 16			Brn med-fine stiff well sorted sand, some silt	400		13
	6	10-12		15	24	29 26			Coarse brn sand w/ some silt	800		9
	7	12-14		24	31	52 36				50		12
15	8	14-16		30	25	26 24		Silty Clay	V stiff grey grn silty clay	0		3
	9	16-18		3	4	5 7				0		6
20	10	18-20		7	20	21 20				100		18
	11	20-22		10	11	12 11			Sample #11 contained Bentonite from well pack around EW #1			
	12	22-24	SS	-	-	-			Sample #12 contained sand pack of well EW #1 No samples collected from 11 or 12 B.O.B. @ 24' No Water			
25												

GROUND SURFACE TO ______ USED ______ CASING: THEN ______

140lb Wt. x 30" fall on 2" O.D. Sampler

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

Cohesionless Density	
0-10	Loose
10-30	Med Dense
30-50	Dense
50 +	Very Dense

Cohesive Consistency	
0-4	Soft
4-8	M/Stiff
8-15	Stiff
15-30	V-Stiff
30 +	Hard

SUMMARY
Earth Boring ______
Rock Coring ______
Samples ______

HOLE NO

TOWN PRESS — EAST PROV.

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ALLIANCE
Technologies Corporation

Boring #10
adj. to MW #4

TEST BORING LOG
BORING NO.
SHEET NO 1 OF 1

PROJECT : 7531002
CLIENT : Enviresponse
BORING CONTRACTOR : Hydro Group
GROUND WATER

JOB NO
ELEVATION
DATE STARTED 4-21-88
DATE FINISHED 4-21-88
DRILLER Bob P.
INSPECTOR J. Thomas

DATE	TIME	WATER EL.	SCREEN		CAS	SAMP	CORE	TUBE
				TYPE				
				DIA				
				WT.				
				FALL				

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE OVA	Pen	Rec
	1	0-2	SS	3	3	4		Sand	Dk organic soil, wood chips	0		16
						3						
	2	2-4		3	4	8			Soft lt brn well sorted sand. Fine-med grn	20		17
						8						
5	3	4-6		11	10	7			Lt brn fine sand, silty sand	5		6
						7						
	4	6-8		8	8	8			M stiff fine silty sand, brn - lt brn	20		18
						11						
	5	8-10		7	17	22			Fine-med sand w/ some gravel	20		17
10						26						
	6	10-12		30	29	30	12'	Silty Clay	Stiff grey grn silty clay	20		16
						38						
	7	12-14		3	5	9				0		24
						19						
15	8	14-16		5	9	27	15'	Sand & Gravel	Brn coarse sand & gravel, rocks & rock fragments	5		14
						29						
	9	16-18		4	7	34			Lt brn coarse-med well sorted sand w/ some silt & fine sand	0		14
						40						
	10	18-20		30	31	45				0		15
20						53						
	11	20-22		10	15	15			Fine-med sand, lt brn, well sorted, silty sand	0		18
						20						
	12	22-24	SS	15	25	33				0		16
						32						
25									B.O.B. @ 24' No Water			

GROUND SURFACE TO ______ USED ______ CASING: THEN ______

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density	
0-10	Loose
10-30	Med. Dense
30-50	Dense
50 +	Very Dense

Cohesive Consistency		
0-4	Soft	30 + Hard
4-8	M/Stiff	
8-15	Stiff	
15-30	V-Stiff	

SUMMARY
Earth Boring ______
Rock Coring ______
Samples ______

HOLE NO.

TOWN PRESS — EAST PROV.

ALLIANCE
Technologies Corporation

Boring #11
adj. to MW #1

TEST BORING LOG
BORING NO.

PROJECT : 7531002	SHEET NO 1 OF
CLIENT : Enviresponse	JOB NO
BORING CONTRACTOR : Hydro Group	ELEVATION
GROUND WATER	DATE STARTED 4-22-88
	DATE FINISHED 4-22-88
	DRILLER Bob Penalis
	INSPECTOR J. Thomas

DATE	TIME	WATER EL.	SCREEN

	CAS	SAMP	CORE	TUBE
TYPE				
DIA				
WT.				
FALL				

DEPTH	~~Casing Blows per foot~~	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From - To 0-6	6-12	12-18	~~Moisture Density & Consist~~	Strata Change Etc.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE OVA	Pen	Rec
	1	0-2'	SS	3	3	4			Soft organic soil, blk oily band -	2		17
						6		S				
	2	2-4		9	12	13		a	Dk brn silty sand w/ some cynders	2		9
						8		n				
								d	Brn fine-med well sorted sand, some silt			
5	3	4-6		6	8	9				10		10
						9			Brn fine sand			
	4	6-8		7	7	15			Lt brn fine - V fine sand	0		18
						19						
	5	8-10		14	27	32	10'		Some silt - coarse sand & gravel, rocks	17		25
10						36		Gravel				
	6	10-12		20	20	33	11'	Silty Clay	V stiff grey grn silty clay w/ some sand stringers	50		16
						42						
	7	12-14		11	8	9				5		20
						13	15'					
15	8	14-16		5	10	58		S	V. coarse sand & gravel	0		16
						80						
	9	16-18		33	53	60		a	Brn well sorted med grn sand w/ some fine sand	0		24
						57		n				
	10	18-20		10	15	20		d	V fine lt brn sand w/ some silt	0		22
20						26						
	11	20-22		20	42	45			Brn coarse sand, well sorted	0		22
						46						
	12	22-24	SS	13	15	60				0		20
						80						
25									B.O.B. @ 24' No Water			

GROUND SURFACE TO ________ USED ________ CASING THEN ________

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY:
Earth Boring ______
Rock Coring ______
Samples ______

HOLE NO

TOWN PRESS — EAST PROV.

ALLIANCE Technologies Corporation

Boring #12
adj. to EW #4

TEST BORING LOG
BORING NO.

SHEET NO 1 OF 1
JOB NO
ELEVATION
DATE STARTED 4-22-88
DATE FINISHED 4-22-88
DRILLER Bob Penalis
INSPECTOR J. Thomas

PROJECT : 7531002
CLIENT : Enviresponse
BORING CONTRACTOR : Hydro Group
GROUND WATER

DATE	TIME	WATER EL	SCREEN		CAS	SAMP	CORE	TUBE
				TYPE				
				DIA				
				WT.				
				FALL				

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6 on Sampler 0-6	6-12	12-18	Moisture Density Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE OVA	Pen	Rec
	1	0-2'	SS	3	7	6			Brn med sand, some organic soil, wood chips	0		13
						5						
	2	2-4		3	3	5		Sand	Lt brn med sand w/ some silt. Oil stains	10		20
						12						
									Lt brn fine - V fine sand			
5	3	4-6		7	17	13			Oil stained med sand	40		16
						9			Dk brn med-fine silty sand			
	4	6-8		7	10	20			V fine - fine lt brn silty sand, V stiff	50		11
						15						
	5	8-10		14	16	16			Fine silty lt brn sand	5		22
10						14						
	6	10-12		13	24	30				20		20
						27						
	7	12-14		40	42	59	14'		Rocks, coarse sand, some gravel	50		20
						65	15'	Gravel				
15	8	14-16		7	11	11				20		12
						15		Clay	V stiff grey-grn silty clay			
	9	16-18		9	42	50				10		22
	10	18-20		17	27	31			Varied clays	0		24
						32						
20	11	20-22		25	36	36				5		20
						51	22'					
	12	22-24	SS	23	60	56		Gravel Sand	Coarse sand & gravel	0		15
						56			Lt brn fine-med silty sand			
25												
									B.O.B. @ 24' No Water			

GROUND SURFACE TO ______ USED ______ CASING THEN ______

140 lb Wt x 30" fall on 2" O.D. Sampler

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

Cohesionless Density	
0-10	Loose
10-30	Med Dense
30-50	Dense
50 +	Very Dense

Cohesive Consistency	
0-4	Soft
4-8	M/Stiff
8-15	Stiff
15-30	V-Stiff
30 +	Hard

SUMMARY
Earth Boring ______
Rock Coring ______
Samples ______

HOLE NO

TOWN PRESS — EAST PROV

ALLIANCE
Technologies Corporation

Boring #13
adj. to MW #3

TEST BORING LOG
BORING NO.

PROJECT : 7531002	SHEET NO 1 OF 1
CLIENT : Enviresponse	JOB NO
BORING CONTRACTOR : Hydro Group	ELEVATION
	DATE STARTED 4-25-88
	DATE FINISHED 4-25-88
	DRILLER Bob Penalis
	INSPECTOR J. Thomas

GROUND WATER

DATE	TIME	WATER EL.	SCREEN		CAS	SAMP	CORE	TUBE
				TYPE				
				DIA				
				WT.				
				FALL				

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6 on Sampler 0-6	6-12	12-18	Moisture Density or Consist	Strata Change Ele.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE OVA	Pen	Rec
	1	0-2'	SS	3	6	7 9		Sand	Wood chips, some organic soil, lt brn fine-med well sorted sand - 3' = cynders, oily sheen	0		10
	2	2-4		7	6	9 14				600		18
5	3	4-6		11	12	13 13			Lt brn fine-med sand	25		16
	4	6-8		11	13	13 15			Lt brn fine silty sand	20		18
	5	8-10		16	25	23 24			Stiff V fine brn silty sand	50		24
10	6	10-12		10	30	36 46	13'			200		18
	7	12-14		5	5	9 18		Silty Clay	V stiff grey-grn silty clay w/ some sand stringers	10		14
15	8	14-16		19	53	61 64			Varied clays	10		22
	9	16-18		36	60	81 100	19'			15		20
	10	18-20		9	18	27 24		Sand & Gravel	V coarse sand & gravel	5		10
20	11	20-22		16	27	29 38				0		13
	12	22-24	SS	12	25	20 20				0		12
25									B.O.B. @ 24' No Water			

GROUND SURFACE TO ________ USED ________ CASING THEN ________

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density	
0-10	Loose
10-30	Med Dense
30-50	Dense
50 +	Very Dense

Cohesive Consistency	
0-4	Soft
4-8	M/Stiff
8-15	Stiff
15-30	V-Stiff
30 +	Hard

SUMMARY
Earth Boring ________
Rock Coring ________
Samples ________

HOLE NO

TOWN PRESS — EAST PROV

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APPENDIX C

ENGINEERING BORINGS

Engineering Borings

Shelby tube samples were collected from four locations during the course of this project. Two locations were sampled to 24 feet during both the pre (EB1 and EB2) and post (EB3 and EB4) treatment phases. Twenty three samples were collected during pretreatment and twenty one samples were collected during post treatment. All samples were analyzed for moisture, particle density, bulk density, grain size and permeability at the GZA Geotechnical Laboratory in Newton, MA.

Some samples were unsuitable for permeability testing due to disturbance or insufficient sample quantity. The samples which were unable to be tested are:

EB1- 2
EB1- 5
EB1- 6
EB1-11
EB2- 6
EB2-11
EB2-12
EB2-13
EB4- 4
EB4- 8
EB4-11

Included are the Laboratory Testing Data Summary sheets which presents the results of all geotechnical tests.

Summary Sheet Key:

Water Content % = percent moisture
Porosity % = function of particle density and bulk density

Grain Size

Sieve -200 = percent fines by weight
Hydrometer -2u = percent fines by weight
Gs - specific gravity, a measure of particle density
γd - bulk density in pounds per cubic foot.

LABORATORY TEST PROCEDURES

Terra-Vac Demonstration Project
Groveland, Massachusetts
File No. L-10636

1. The following tests were performed with the noted ASTM test designation:

TEST	ASTM DESIGNATION
Grain Size	D422-63 (see Item 2)
Moisture Content	D2216-80
Permeability Test	(see Item 2)
Specific Gravity	D854-83

2. Test Procedures for Combined Sieve and Hydrometer Analysis

When both sieve and hydrometer analyses are required a combined mechanical analysis is performed. This procedure is, in part, similar to ASTM's 2217-66 (wet preparation of soil sample for grain-size analysis and determination of soil constants-B).

A representative portion of the minus No. 4 material was mixed with water so as to form a thin homogeneous slurry. The fines suspended in this slurry were then decanted into an empty hydrometer jar, and the mixing-decanting process repeated until most of the fines had been removed. Coarser fractions remaining after the decantation were then oven dried and sieved through a nest of screens (Nos. 10, 20, 40, 50, 100, and 200). Any material passing the No. 200 screen was added to the hydrometer jar containing the finer fraction.

Hydrometer analysis of these fines was performed in the conventional manner.

3. Test Procedures for Permeability Tests

Test samples were performed on full diameter samples (2.87-inch diameter and 5.75-inch length) or were trimmed in a vertical lathe to dimensions of approximately 2.00-inch diameter and 4.00-inch length. Water contents were obtained from trimmings adjacent to the test sample, the specimen's weight was determined, and its dimensions verified.

After trimming, the test specimen was placed on a previously de-aired triaxial cell base and porous stone. A membrane was added and the sample was sealed top on bottom by "O" rings.

Samples were back pressured under a small effective stress to create complete saturation of the samples. The chamber pressure was then increased such that the desired consolidation effective stress was obtained. This effective consolidation stress was allowed to act for 24 hours±. During the consolidation phase, readings of volume change versus time were recorded.

After consolidation, the response of the soil samples was checked by increasing the cell pressure and monitoring the pore pressure. Where required, additional back pressure was applied so as to achieve a pore pressure response equal to or greater than 95 percent. When the desired saturation was achieved, the samples were attached to the permeability apparatus and tested in accordance with procedures described in the Army Corps of Engineers Manual EM 1110-2-1906, Appendix VII, pages VII 17 through VII 22, Number 7, "Falling Head Permeability Test with Back Pressure." Records of head change vs time were recorded for the test with the permeability value reported being the average of several consistent values obtained during the test.

Terra-Vac Demonstration Project
Groveland, MA

LABORATORY TESTING DATA SUMMARY

Reviewed by ________
Date ________

Project No. L-10636 Project Engr. D. Schulze Assigned By P. Ford Date Assigned Dec. 87 Required ________

				IDENTIFICATION TESTS								STRENGTH TESTS					CONSOL.	
Boring No.	Sample No.	Depth ft.	Laboratory or Test No.	Water Content %	LL %	Porosity n(%)	Sieve -200 %	Hyd -2μ %	G_s	γ_d pcf	Permeability cm/sec.	Torvane or Type Test	σ_c or $\bar{\sigma}_c$ or σ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	C_c / e_o	Laboratory Log and Soil Description
FB1	1	0-2	1		Average Total Unit Weight (0-1.1') = 114.2 pcf													Brown, fine to medium SAND, little(+) Gravel, trace Silt. trace Organic Matter
		0.2		10.8														
		0.2-0.5					8	1	2.63									
		0.5		16.8														
		0.6 0.9		17.0		36				105.1	4.6x 10-4	K	$\bar{\sigma}_c$ = 144					
		1.0		17.7														
	2	3.5-4.5	2		Average Total Unit Weight (3.5-4.8') = 94.0 pcf													Dark brown. fine to medium SAND, some(-) Silt, trace(+) Roots, Wood Chips at 4.2' change to Black fine to medium SAND, some Silt (oily texture) (Entire Sample Disturbed)
		3.7		17.0														
		4.1		25.3														
		4.3-4.7				60	29	3	2.59									
		4.7		49.9														
	3	5.5-7.5	3		Average Total Unit Weight (5.5-7.5') = 91.7 pcf													Brown fine SAND, some(+) Silt
		5.7		37.7														
		6.1		24.8														
		6.5-6.8		24.1						72.1	1.2 x 10-3	K	$\bar{\sigma}_c$ = 720					
		6.8		22.7														
		6.9-7.3					35	3	2.66									
		7.3		27.1														

SUMMARY OF LAB TESTS
TABLE NUMBER ________

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-2

SM. 2

Terra-Vac Demonstration Project
Groveland, MA

LABORATORY TESTING DATA SUMMARY

Reviewed by ________
Date ________

Project No. L-10636 Project Engr. D. Schulze Assigned By P. Ford Date Assigned Dec. 87 Required ________

Boring No.	Sample No.	Depth ft.	Laboratory or Test No.	IDENTIFICATION TESTS							Permeability cm/sec	STRENGTH TESTS					CONSOL.	Laboratory Log and Soil Description
				Water Content %	LL %	Porosity n(%)	Sieve -200 %	Hyd -2μ %	G_s	γ_d pcf		Torvane or Type Test	σ_c or $\bar{\sigma}_c$ or σ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	C_c / e_o	
EB1	4	7.5-9.5	4		Average Total Unit Weight (7.5-9.5') = 97.5 pcf													Dark brown, fine to coarse SAND, some Gravel, little Silt at 7.8' change to Brown, fine to medium SAND, little(+) Silt
		7.8		20.0														
		7.8-8.2		SAVE														
		8.2		13.4														
		8.3-8.5		11.7						82.5	5.6x 10-4	K	σ_c = 892					
		8.5-8.8					19	1	2.68									
		8.8		11.8														
		8.9-9.2		SAVE														
		9.2		8.8														
	5	9.5-11.5	5		Average Total Unit Weight (9.5-11.0') = 116.4 pcf													Brown, fine to medium SAND, little(-) Silt
		9.7		7.9														
		10.0		7.3														
		10.0-10.4					14	1	2.67									
		10.4		12.0														
		10.5-10.8		SAVE														
		10.9		11.2														

SUMMARY OF LAB TESTS
TABLE NUMBER ________

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-2

SM. 2

Terra-Vac Demonstration Project
Groveland, MA

LABORATORY TESTING DATA SUMMARY

Reviewed by ______
Date ______

Project No. L-10636 Project Engr. D. Schulze Assigned By P. Ford Date Assigned Dec. 87 Required ______

				IDENTIFICATION TESTS								STRENGTH TESTS					CONSOL.	
Boring No.	Sample No.	Depth ft.	Laboratory or Test No.	Water Content %	LL %	Porosity n(%)	Sieve -200 %	Hyd -2μ %	G_s	γ_d pcf	Permeability cm/sec	Torvane or Type Test	σ_c or $\bar{\sigma}_c$ or σ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	C_c / e_o	Laboratory Log and Soil Description
EB1	6	11-12	6		Average Total Unit Weight (11.0-12.1') = 111.3 pcf													Brown, fine to medium SAND, trace(+) Silt
		11.2		9.6														
		11.4		10.8														
		11.4-11.8				41	7	1	2.67									
		11.8		15.1														
		12.0		18.0														
	7	14-16	7		Average Total Unit Weight (14.0-15.8') = 108.3 pcf													Olive-gray Silty CLAY, some(-) fine Sand lenses/pockets
		14.3		27.7														
		14.4-14.7		SAVE														
		14.7		16.0														
		14.7-15.1					79	40	2.75									
		15.1		22.9														
		15.2-15.6		31.0		47				90.2	2.0×10^{-7}	K	$\bar{\sigma}_c = 1425$					
		15.6		29.8														
	8	16-18	8		Average Total Unit Weight (16.0-18.0') = 112.7 pcf													Olive-gray Silty CLAY, trace(+) fine Sand
		16.2		39.1														
		16.7		28.9														
		16.7-17.1					91	30	2.76									
		17.1		36.0														
		17.3-17.7		37.7		52				82.8	5.5×10^{-7}	K	$\bar{\sigma}_c = 1540$					
		17.7		34.6														

SUMMARY OF LAB TESTS
TABLE NUMBER ______

Terra-Vac Demonstration Project
Groveland, MA

LABORATORY TESTING DATA SUMMARY

Reviewed by ____________
Date ____________

Project No. L-10636 Project Engr. D. Schulze Assigned By P. Ford Date Assigned Dec. 87 Required ____________

				IDENTIFICATION TESTS								STRENGTH TESTS					CONSOL.	
Boring No.	Sample No.	Depth ft.	Laboratory or Test No.	Water Content %	LL %	Porosity n(%)	Sieve -200 %	Hyd -2μ %	G_s	γ_d pcf	Permeability cm/sec	Torvane or Type Test	σ_c or $\bar{\sigma}_c$ or σ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	C_c / e_o	Laboratory Log and Soil Description
EB1	9	18-20	9		Average Total Unit Weight (18.0-19.6') -- 109.1 pcf													Olive-gray Silty CLAY, trace fine Sand, trace thin Silt layers
		18.2		33.9														
		18.6		38.2														
		18.6-19.0		36.0		50				85.3	1.1x10-7	K	$\bar{\sigma}_c$ = 1650					
		19.1		36.9														
		19.2-19.5		36.5			97	44	2.75									
	10	23-23.5	10		Average Total Unit Weight (23.0-23.4') = 117.9 pcf													Brown fine to medium SAND, trace Silt
		23.1		8.8														Note: Insufficient sample to perform permeability test
		23.1-23.4				35	5	2	2.67									

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

SUMMARY OF LAB TESTS
TABLE NUMBER ________

APPENDIX E-2

SM. 2

Terra-Vac Demonstration Project
Groveland, MA

LABORATORY TESTING DATA SUMMARY

Reviewed by ____________
Date ____________

Project No. L-10636 Project Engr. D. Schulze Assigned By P. Ford Date Assigned Dec. 87 Required ____________

				IDENTIFICATION TESTS								STRENGTH TESTS					CONSOL.	
Boring No.	Sample No.	Depth ft.	Laboratory or Test No.	Water Content %	LL %	Porosity n(%)	Sieve -200 %	Hyd -2μ %	G_s	γ_d pcf	Permeability cm/sec	Torvane or Type Test	σ_c or $\bar{\sigma}_c$ or σ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or T psf	Strain %	C_c / e_o	Laboratory Log and Soil Description
EB2	1	0-2	11		Average Total Unit Weight (0-1.2) = 113.0 pcf													Brown, fine to medium SAND, little(+) Silt, trace fine Gravel, trace Organic Matter
		0.2		5.7														
		0.5		15.8														
		0.7		28.0														
		0.7-1.1		17.0		41	17	1	2.62	96.4	1.6x 10-4	K	$\bar{\sigma}_c$ = 144					
		1.2		13.2														
	2	2-4	12		Average Total Unit Weight (2.0-3.4') = 96.9 pcf													Brown, fine to medium SAND, some(-) Silt
		2.2		9.1														
		2.5		8.2														
		2.7-3.0					21	1	2.66									
		3.0		15.3														
		3.1-3.3		17.2		47				88.8	5.0x 10-4	K	$\bar{\sigma}_c$ = 288					
		3.3		19.9														
	3	4-6	13		Average Total Unit Weight (4.0-5.4') = 104.9 pcf													Brown, fine to medium SAND, some(-) Silt, trace lenses/ layers of Organic Matter
		4.1		7.9														
		4.5		44.8														
		4.6 4.8					20	1	2.63									
		4.8		15.6														
		4.9-5.2		27.2		49				83.3	9.1x 10-5	K	$\bar{\sigma}_c$ = 288					
		5.2		30.4														

SUMMARY OF LAB TESTS
TABLE NUMBER ____________

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

Terra-Vac Demonstration Project
Groveland, MA

LABORATORY TESTING DATA SUMMARY

Reviewed by ________
Date ________

Project No. L-10636 Project Engr. D. Schulze Assigned By P. Ford Date Assigned Dec. 87 Required ________

Boring No.	Sample No.	Depth ft.	Laboratory or Test No.	IDENTIFICATION TESTS							Permeability cm/sec	STRENGTH TESTS					CONSOL.	Laboratory Log and Soil Description
				Water Content %	LL %	Porosity n(%)	Sieve -200 %	Hyd -2μ %	G_s	γ_d pcf		Torvane or Type Test	σ_c or $\bar{\sigma}_c$ or σ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	C_c / e_o	
EB2	4	6-8	14		Average Total Unit Weight (6.0-8.0') = 97.0 pcf													Dark brown SILT and fine SAND, trace Organics (Roots, Wood Chips) at 7.0' change to Brown, fine to medium SAND, some Silt
		6.2		21.3														
		6.5		19.1														
		6.9		20.7														
		7.0-7.3					26	1	2.65									
		7.3		18.1														
		7.4-7.8		20.0		49				91.7	2.8x 10-4	K	$\bar{\sigma}_c$ = 432					
		7.9		17.0														
	5	8-10	15		Average Total Unit Weight (8.0-9.5') = 100.0 pcf													Brown, fine to medium SAND, little Silt, trace(-) Organics
		8.2		8.8														
		8.4		6.2														
		8.7		8.2														
		8.8-9.0					13	1	2.67									
		9.0		8.7														
		9.0-9.4		15.6		42				96.2	7.8x 10-4	K	$\bar{\sigma}_c$ = 432					
		9.4		11.3														
	6	10-11	16		Average Total Unit Weight (10.0-10.6') = 112.6 pcf													Brown, fine to medium SAND, trace (+) Silt Note: Entire sample disturbed. Poor recovery
		10.1		8.8														
		10.1-10.3				37	9	1	2.66									
		10.3		7.5														
		10.5		8.5														

SUMMARY OF LAB TESTS
TABLE NUMBER ________

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-2

SM. 2

Terra-Vac Demonstration Project
Groveland, MA

LABORATORY TESTING DATA SUMMARY

Reviewed by ______
Date ______
Required ______

Project No. L-10636 Project Engr. D. Schulze Assigned By P. Ford Date Assigned Dec. 87

				IDENTIFICATION TESTS								STRENGTH TESTS					CONSOL.	
Boring No.	Sample No.	Depth ft.	Laboratory or Test No.	Water Content %	LL %	Porosity n(%)	Sieve -200 %	Hyd -2μ %	G_s	γ_d pcf	Permeability cm/sec	Torvane or Type Test	σ_c or $\bar{\sigma}_c$ or σ psf	Failure Criteria	$\sigma_1-\sigma_3$ or τ psf	Strain %	C_c / e_o	Laboratory Log and Soil Description
EB2	7	12-14	17		Average Total Unit Weight (12.0-13.2') = 119.1 pcf													Olive-gray Silty CLAY, little(+) fine Sand
		12.1		21.9														
		12.4		19.6														
		12.5-12.8		26.2		46				93.5	6.5×10^{-6}	K	$\bar{\sigma}_c$ = 720					
		12.8		29.6														
		12.8-13.0					81	31	2.75									
		13.0		30.0														
																		Olive-gray Silty CLAY, trace fine Sand
	8	14-16	18		Average Total Unit Weight (14.0-15.7') = 119.8 pcf													
		14.2		25.1														
		14.5		22.9														
		14.8		25.2														
		14.8-15.1					94	42	2.75									
		15.1		30.9														
		15.2-15.5		32.9		49				86.9	2.1×10^{-7}	K	$\bar{\sigma}_c$ = 1440					
		15.6		35.3														

SUMMARY OF LAB TESTS
TABLE NUMBER ______

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-2

SM. 2

Terra-Vac Demonstration Project
Groveland, MA

LABORATORY TESTING DATA SUMMARY

Reviewed by ________
Date ________

Project No. L-10636 Project Engr. D. Schulze Assigned By P. Ford Date Assigned Dec. 87 Required ________

Boring No.	Sample No.	Depth ft.	Laboratory or Test No.	IDENTIFICATION TESTS Water Content %	LL %	Porosity n(%)	Sieve -200 %	Hyd -2μ %	G_s	γ_d pcf	Permeability cm/sec	STRENGTH TESTS Torvane or Type Test	σ_c or $\bar{\sigma}_c$ or σ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or T psf	Strain %	CONSOL. C_c / e_o	Laboratory Log and Soil Description
EB2	9	16-18	19		Average Total Unit Weight (16.0-17.8') = 116.8 pcf													Olive-gray Silty CLAY
		16.2		28.6														
		16.5		33.7														
		16.8		32.3														
		16.8-17.1					99	53	2.72									
		17.1		37.6														
		17.2-17.6		33.6		49				87.0	2.7x 10-8	K	$\bar{\sigma}_c$ = 1008					
		17.7		32.1														
	10	18-20	20															Olive-gray Silty CLAY, trace fine Sand at 18.5' change to brown, fine to medium SAND, little Silt, some fine Gravel
		18.0-18.2					94	45	2.73									
		18.2		31.6														
		18.2-18.5		34.5		49				87.4	3.2x 10-8	K	$\bar{\sigma}_c$ = 1540					
		18.6		9.6														
	11	20.0-20.5	21		Average Total Unit Weight (20.0-20.3') = 120.3 pcf													Olive-gray Silty CLAY at 20.2' change to brown, fine to coarse SAND, some Gravel, little Silt Note: Entire sample disturbed. Poor Recovery.
		20.0-20.2				47	92	45	2.75									
		20.2		32.0														
		20.3		7.6														

SUMMARY OF LAB TESTS
TABLE NUMBER ________

Terra-Vac Demonstration Project
Groveland, MA

LABORATORY TESTING DATA SUMMARY

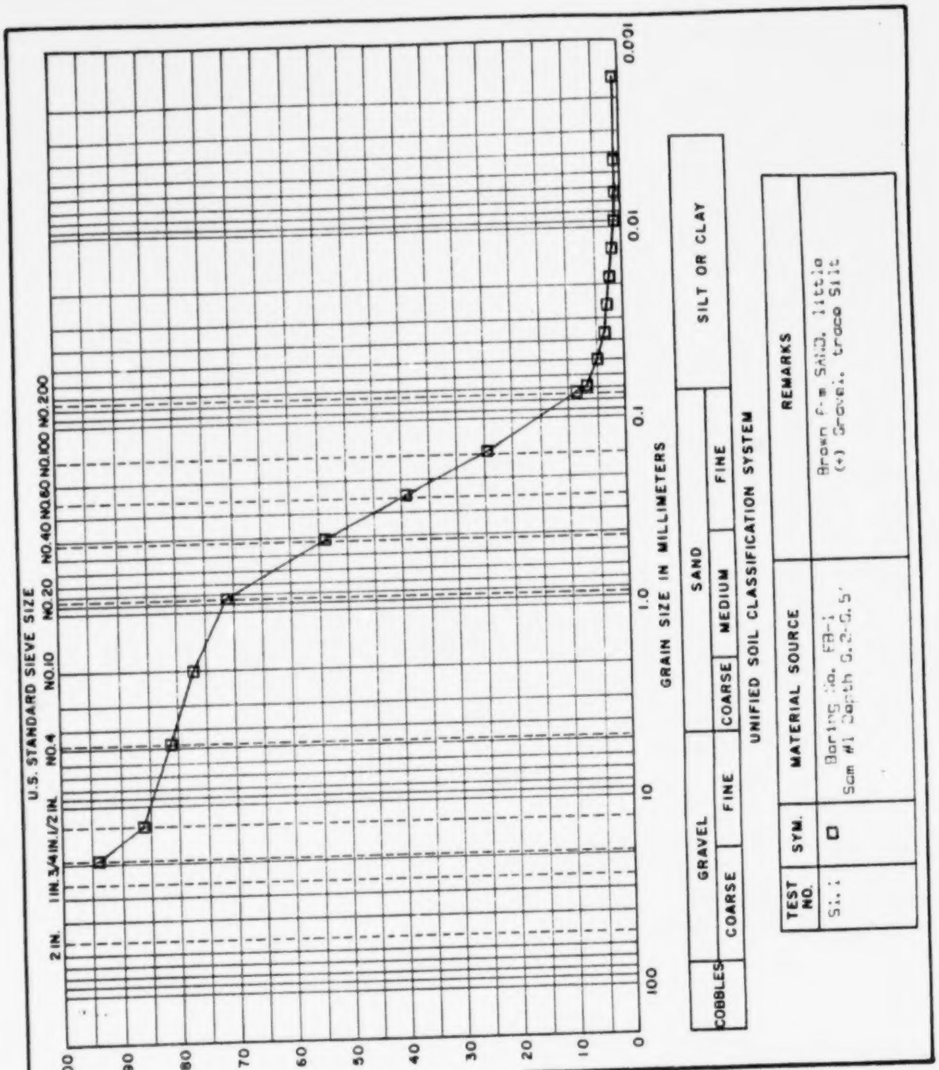
Reviewed by ____________
Date ____________
Required ____________

Project No. L-10636 Project Engr. D. Schulze Assigned By P. Ford Date Assigned Dec. 87

				IDENTIFICATION TESTS								STRENGTH TESTS					CONSOL.	
Boring No.	Sample No.	Depth ft.	Laboratory or Test No.	Water Content %	LL %	Porosity n(%)	Sieve -200 %	Hyd -2μ %	G_s	γ_d pcf	Permeability cm/sec	Torvane or Type Test	σ_c or $\bar{\sigma}_c$ or σ psf	Failure Criteria	$\sigma_1 - \sigma_3$ or τ psf	Strain %	C_c / e_o	Laboratory Log and Soil Description
EB2	12	20.5-22.5	22		Average Total Unit Weight (20.5-21.6') = 130.3 pcf													Brown, fine to medium SAND and GRAVEL, trace Silt Note: Insufficient sample size for permeability tests
		20.7		5.7														
		20.7-21.1				28	6	2	2.67									
		21.1		8.9														
		21.5		10.0														
	13	22.5-24.5	23		Average Total Unit Weight (22.5-24.1') = 116.3 pcf													Brown, fine to coarse SAND, some Gravel, little Silt at 23.1' change to brown, Clayey SILT at 23.4' change to brown, fine to medium SAND, trace(+) Silt Note: Entire sample disturbed
		22.5-22.8		SAVE														
		22.8		8.0														
		22.9-23.2		SAVE														
		23.2		24.7														
		23.2-23.6		SAVE														
		23.7		7.3														
		23.7-23.9				35	10	2	2.66									

SUMMARY OF LAB TESTS
TABLE NUMBER ______

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S1.1	☐	Boring No. EB-1 Sam #1 Depth 0.2-0.5'	Brown f-m SAND, little (+) Gravel, trace Silt

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

GRADATION TESTS

BORING NO. EB-1
SAMPLE 1
DEPTH 0.2-0.5'
TECH. VST
REVIEWER

TEST SERIES
NO. 1
DATE Jan 88
LIC636
FILE

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GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S.3

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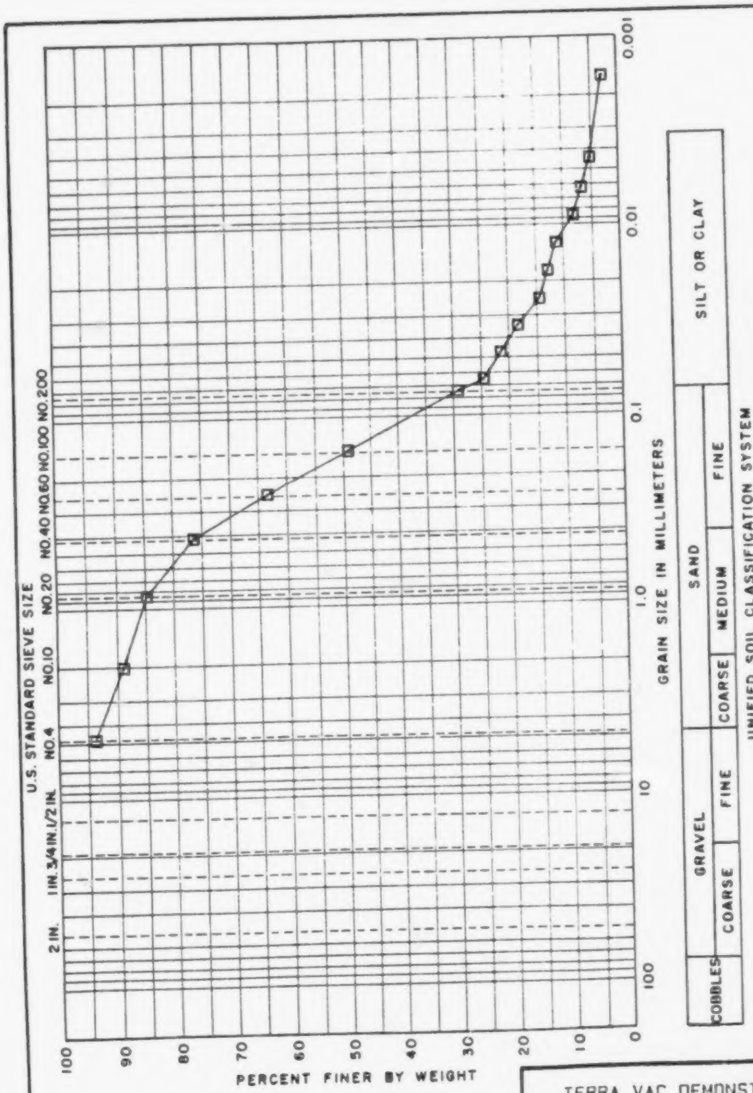

TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S2.1	□	Boring No. EB-1 Sam #2 Depth 4.3-4.7'	Black f-m SAND, some Silt

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

GRADATION TESTS

BORING NO. EB-1
SAMPLE 2
DEPTH 4.3-4.7'
TECH. MST
REVIEWER

TEST SERIES
NO. 2
DATE Jan 88
L10636
FILE

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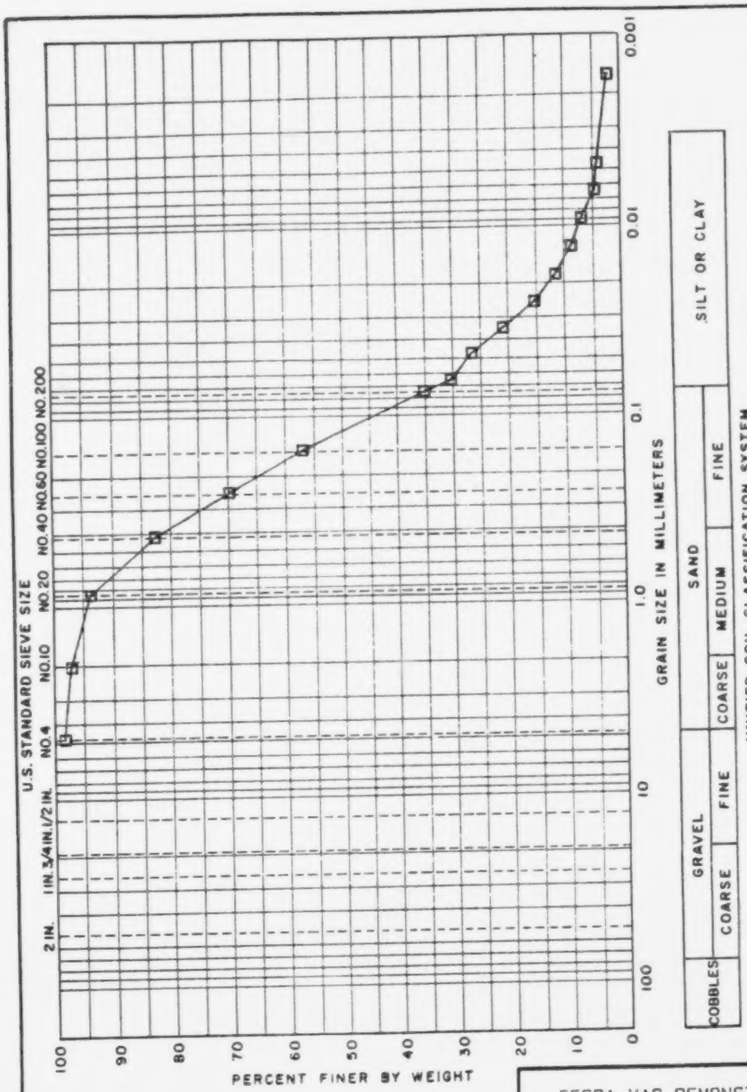
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S3.1	☐	Boring No. EB-1 Sam #3 Depth 6.9-7.3'	Brown fine SAND, some (+) Silt

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

GRADATION TESTS

BORING NO. EB-1
SAMPLE 3
DEPTH 6.9-7.3'
TECH. MST
REVIEWER

TEST SERIES NO. 3
DATE Jan 88
L10636
FILE

APPENDIX E-9

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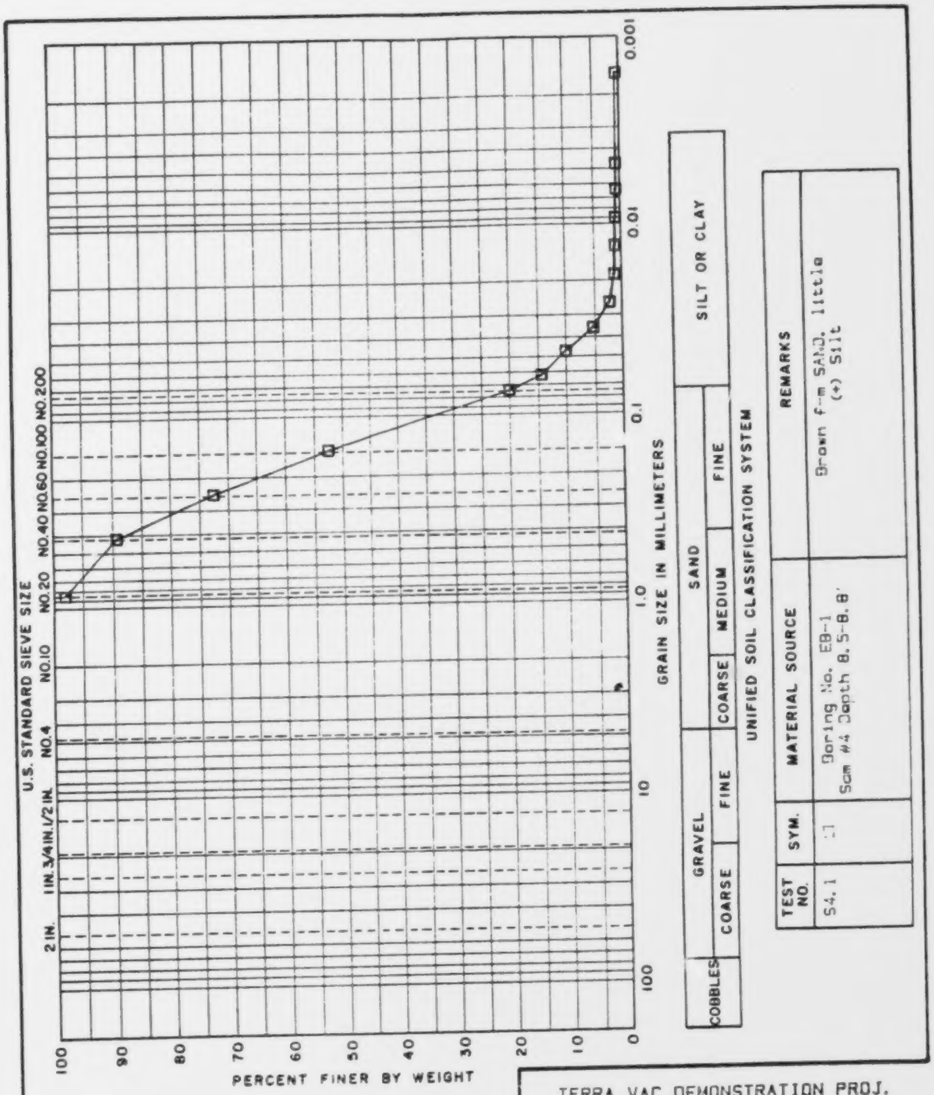

TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S4.1	◻	Boring No. EB-1 Sam #4 Depth 8.5-8.8'	Brown f-m SAND, little (+) Silt

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

GRADATION TESTS

BORING NO. EB-1
SAMPLE 4
DEPTH 8.5-8.8'
TECH. MST
REVIEWER

TEST SERIES
NO. 4
DATE Jan 88
L10636

FILE

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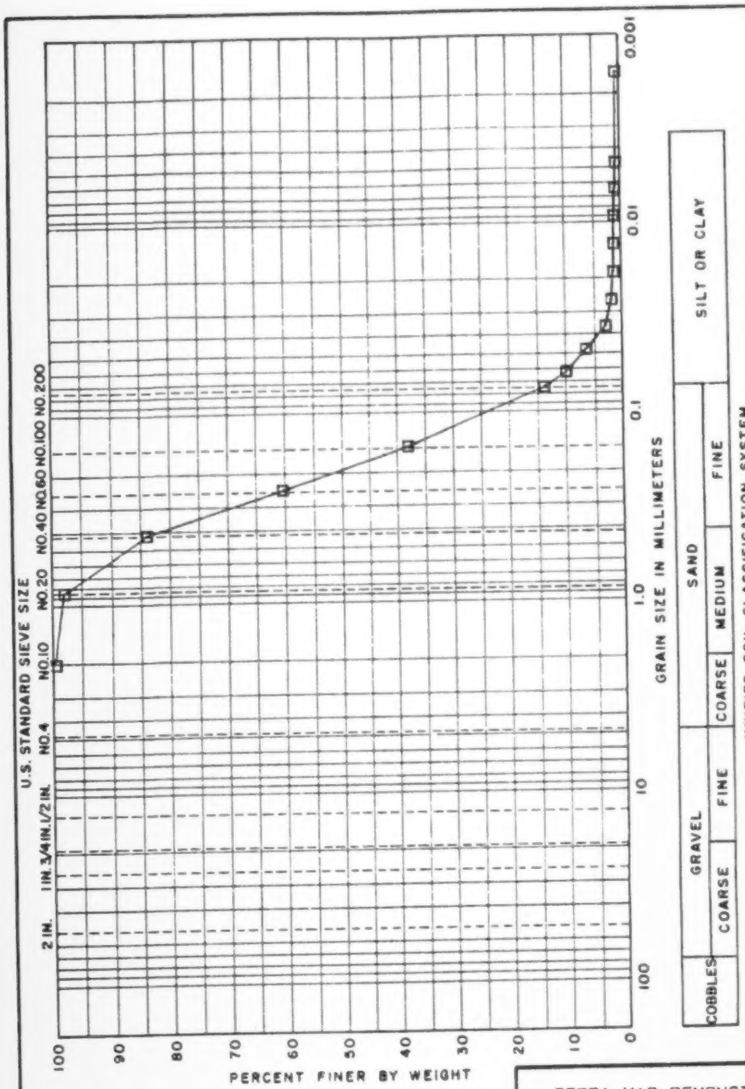


TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S5.1	□	Boring No. LB-1 Depth 10.0-10.4'	Brown f-m SAND, little (-) Silt

TERRA VAC DEMONSTRATION PROJ.

GROVELAND, MASS.

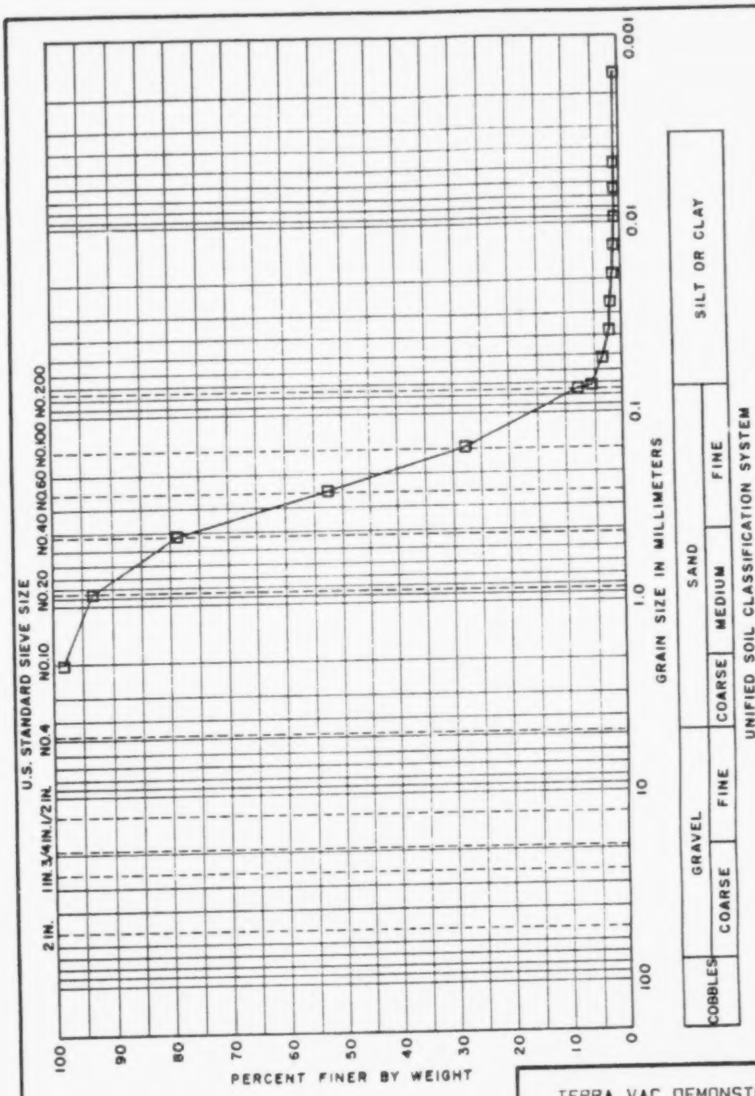
GRADATION TESTS

BORING NO.	LB-1	TEST SERIES NO.	5
SAMPLE	5	DATE	Jan 88
DEPTH	10.0-10.4'		10638
TECH.	MST		
REVIEWER		FILE	

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S6.1	□	Boring No. EB-1 Depth 11.4-11.8'	Brown f-m SAND, trace (+) Silt

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

GRADATION TESTS

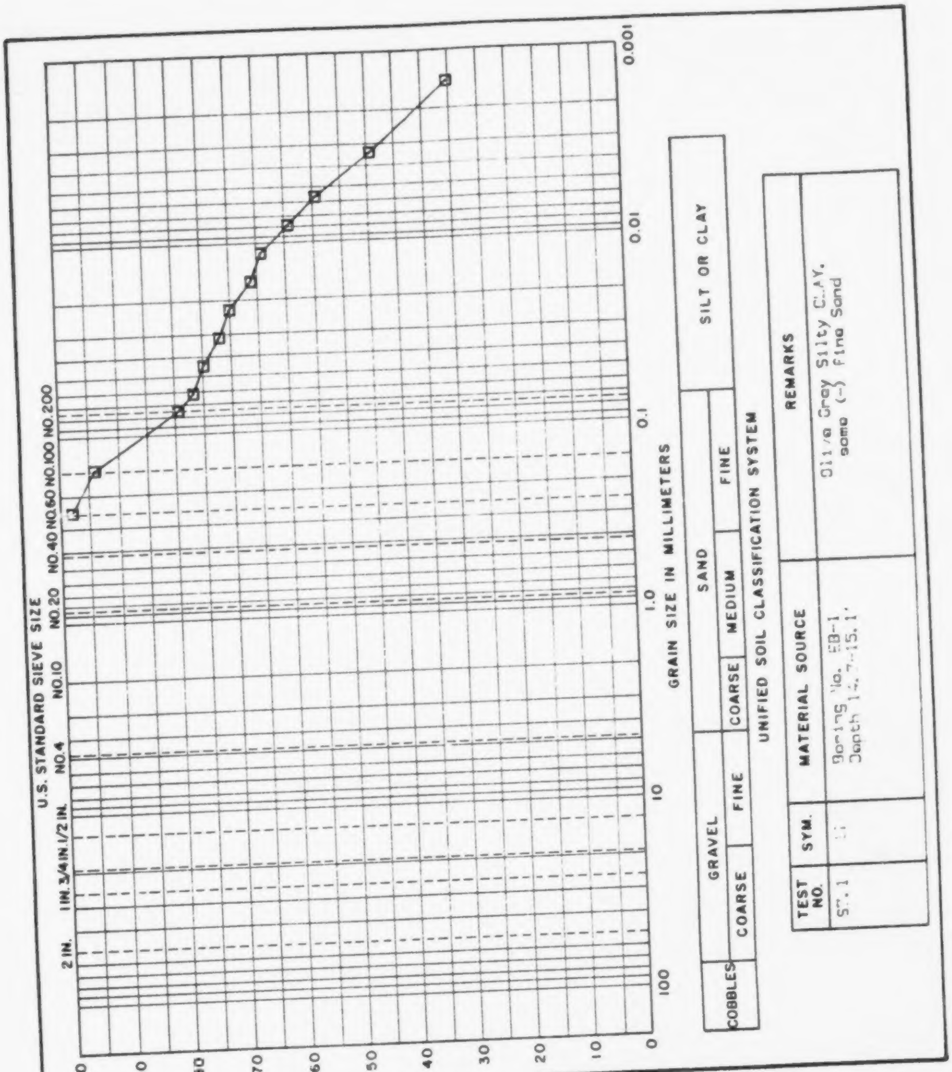
BORING NO. EB-1
SAMPLE 6
DEPTH 11.4-11.8'
TECH. MST
REVIEWER

TEST SERIES NO. 6
DATE Jan 88
10636
FILE

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
ST.1	⊡	Boring No. EB-1 Depth 14.7-15.1'	Olive Gray Silty CLAY, some (-) Fine Sand

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

GRADATION TESTS

BORING NO. EB-1
SAMPLE 7
DEPTH 14.7-15.1'
TECH. MST
REVIEWER

TEST SERIES
NO.
DATE Jan 88
10636
FILE
S 3

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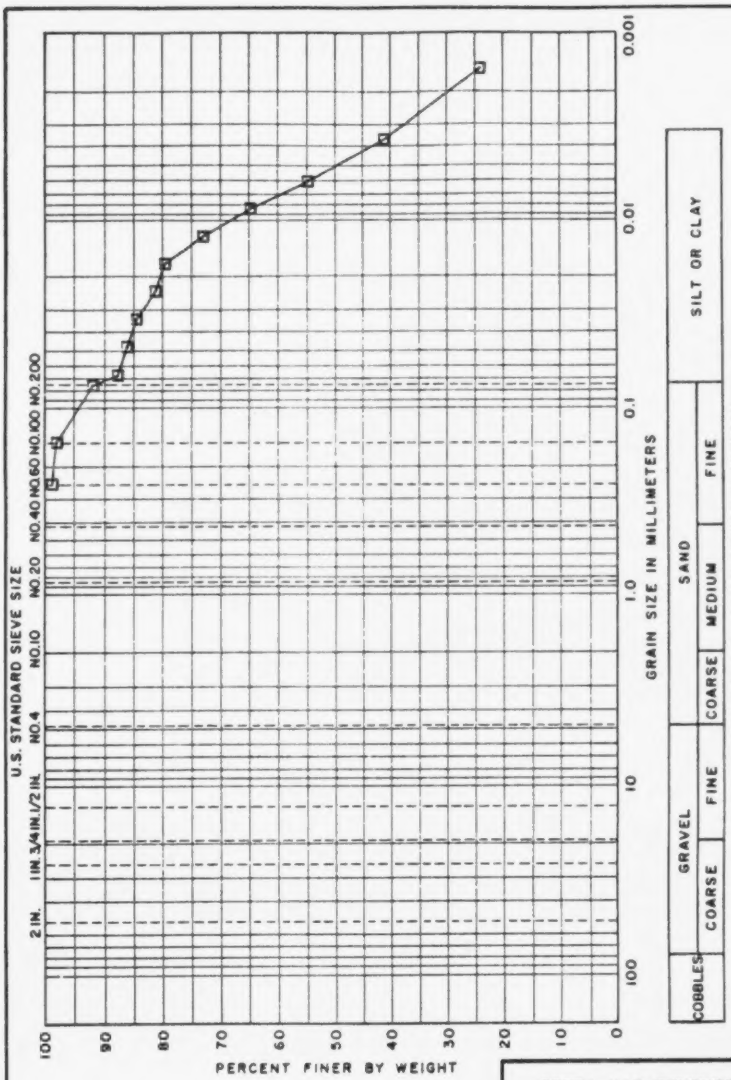
APPENDIX E-9



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
SB.1	⊡	Boring No. SB-1 Depth 16.7' 17.1'	Olive Gray Silty CLAY, trace (+) Fine Sand

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

GRADATION TESTS

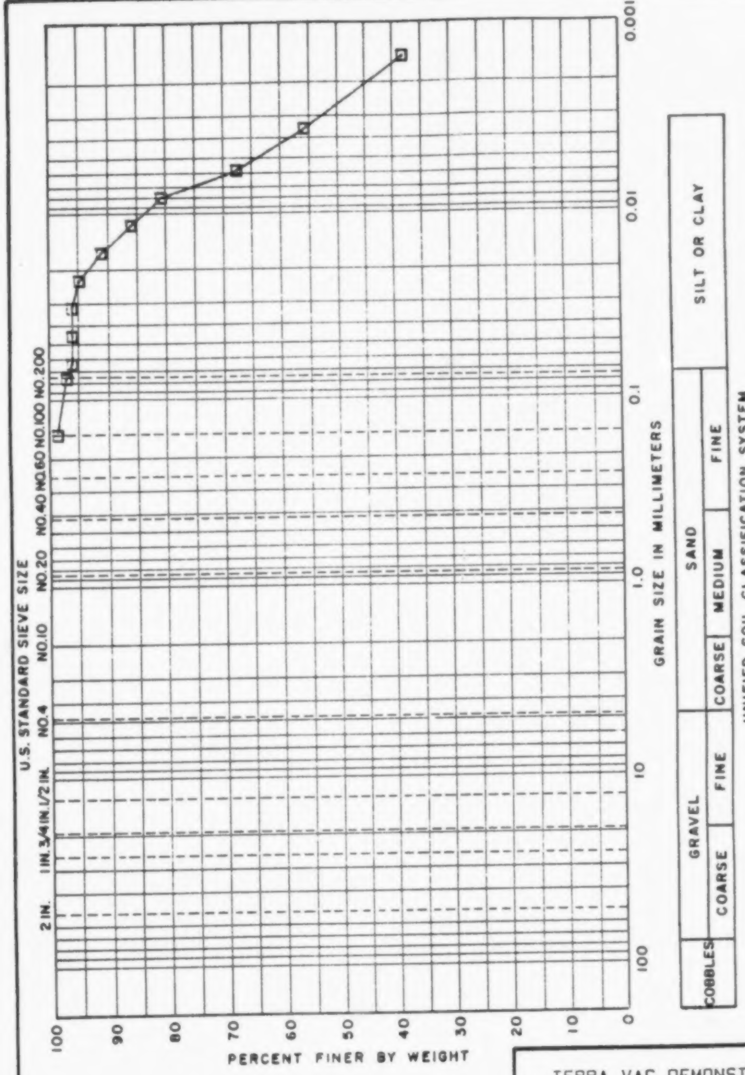
BORING NO. SB-1
SAMPLE 8
DEPTH 16.7' 17.1'
TECH. 4ST
REVIEWER

TEST SERIES
NO. 8
DATE Jan 88
10636

FILE

APPENDIX E-9

S.3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S9.1	◻	Boring No. EB-1 Depth 19.2-19.5'	Oliva Grey Silty CLAY

TERRA VAC DEMONSTRATION PROJ.

GROVELAND, MASS.

GRADATION TESTS

BORING NO. LB-1
SAMPLE 9
DEPTH 19.2-19.5'
TECH. MST
REVIEWER

TEST SERIES
NO. 9
DATE Jan 88
L10638

FILE

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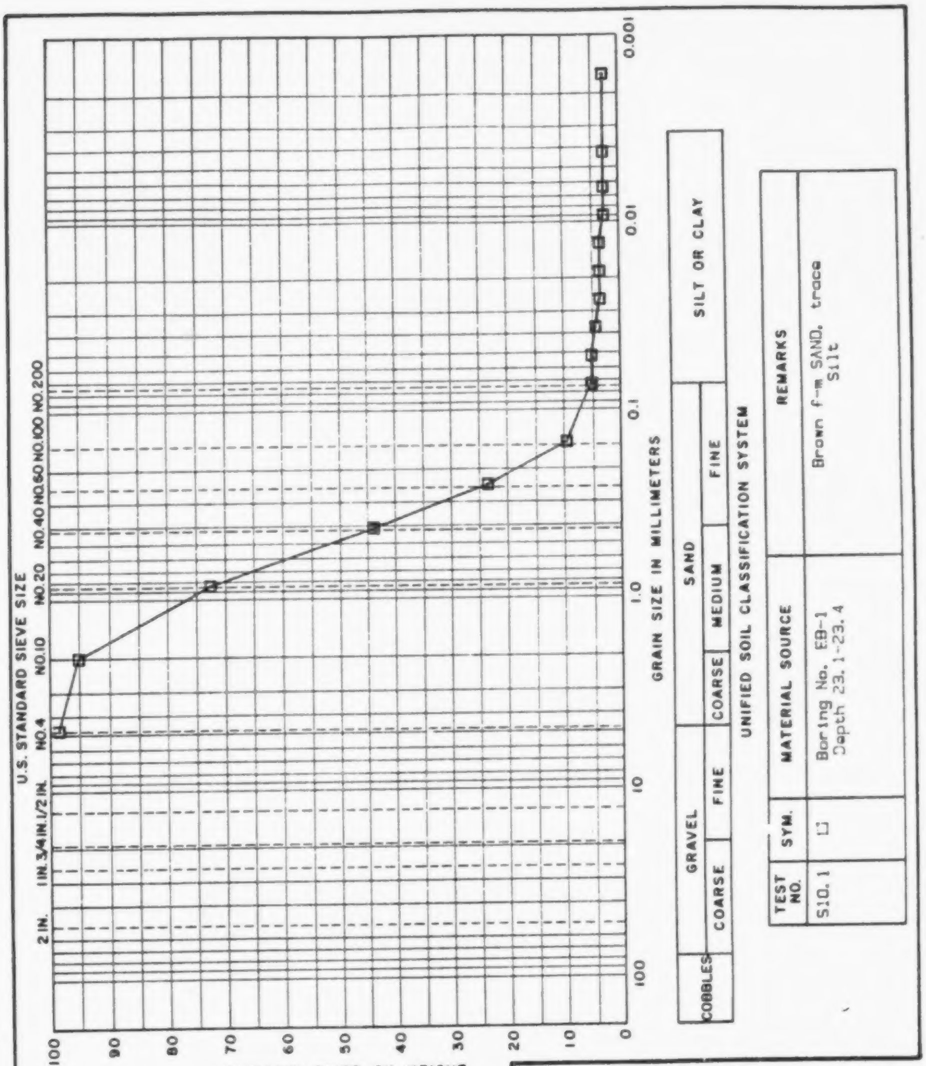
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S.3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S10.1	□	Boring No. EB-1 Depth 23.1-23.4	Brown f-m SAND, trace Silt

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

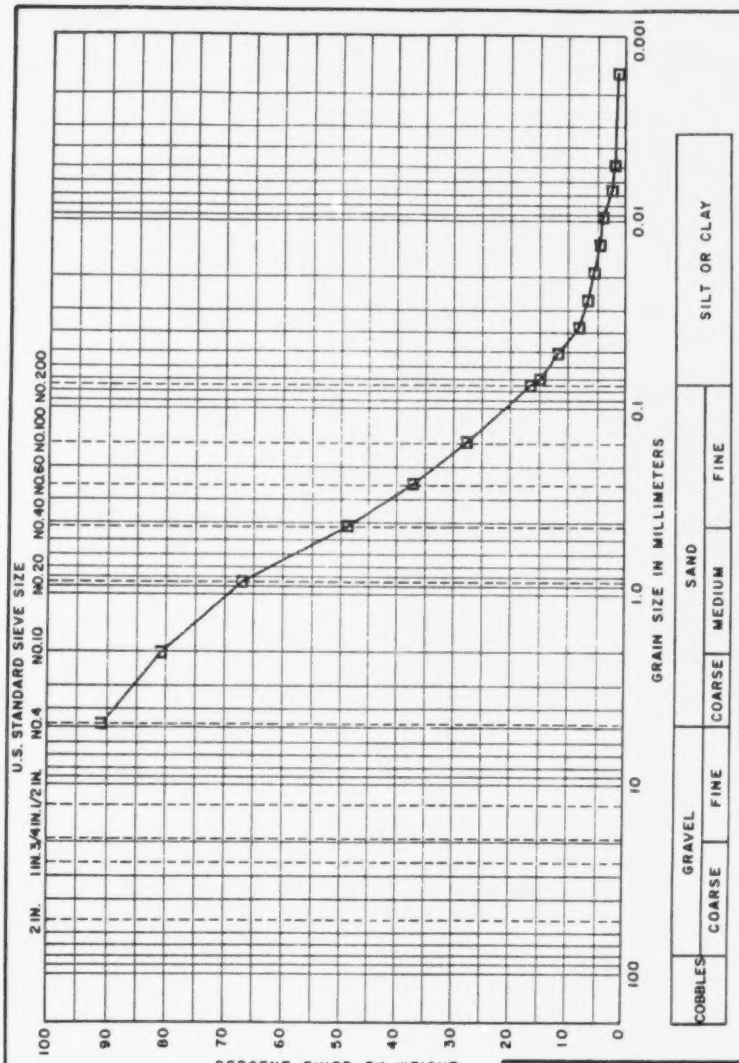
GRADATION TESTS

BORING NO.	EB-1	TEST SERIES NO.	10
SAMPLE	10	DATE	Jan 88
DEPTH	23.1-23.4'		L10638
TECH.	MST		
REVIEWER		FILE	

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S.3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S11.1	□	Boring No. EB-2 Sam #1 Depth 0.7-1.1'	Brown f-m SAND, little (+) Silt, trace Gravel

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

GRADATION TESTS

BORING NO. EB-2
SAMPLE 1
DEPTH 0.7-1.1'
TECH. MST
REVIEWER

TEST SERIES
NO. 11
DATE Jan 88
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FILE

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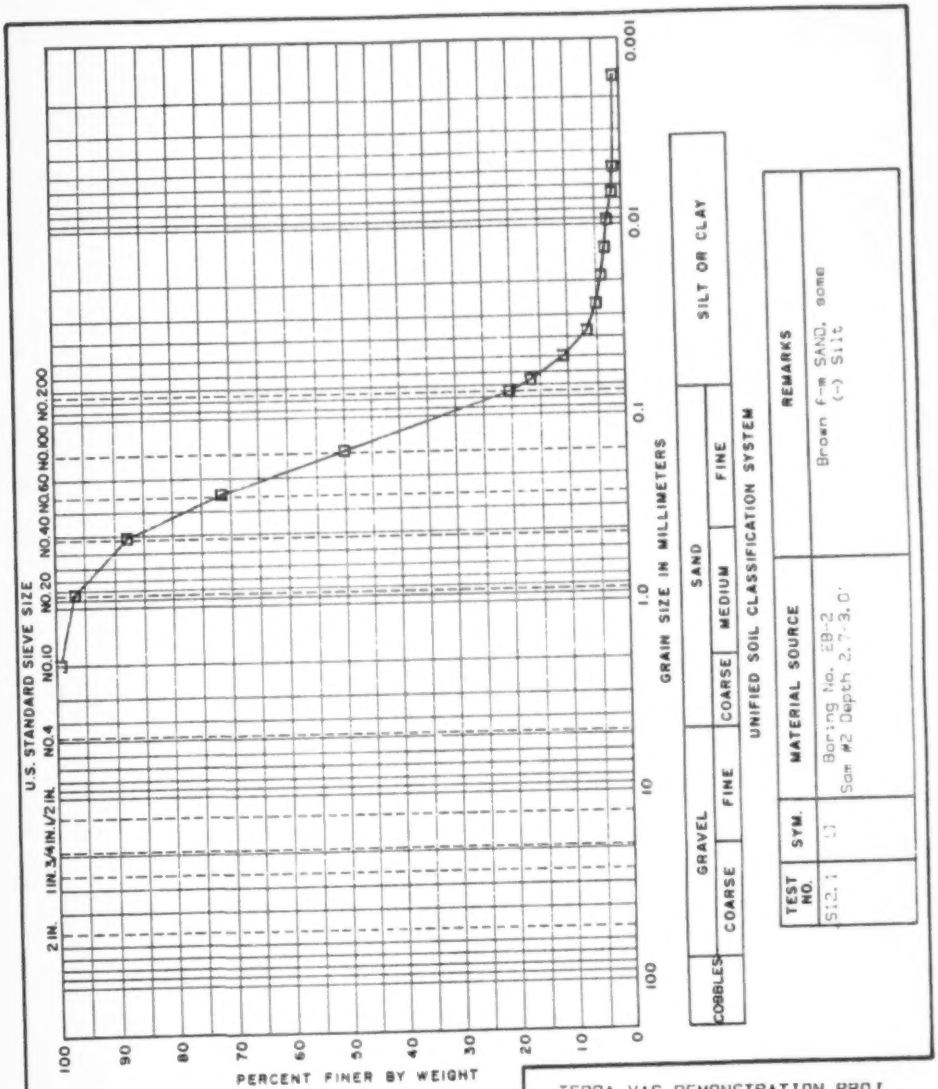
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S.3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S12.1	☐	Boring No. EB-2 Sam #2 Depth 2.7-3.0'	Brown f-m SAND, some (-) Silt

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

GRADATION TESTS

BORING NO. EB-2
SAMPLE 2
DEPTH 2.7-3.0'
TECH. MST
REVIEWER

TEST SERIES
NO. 12
DATE Jan 88
110636
FILE

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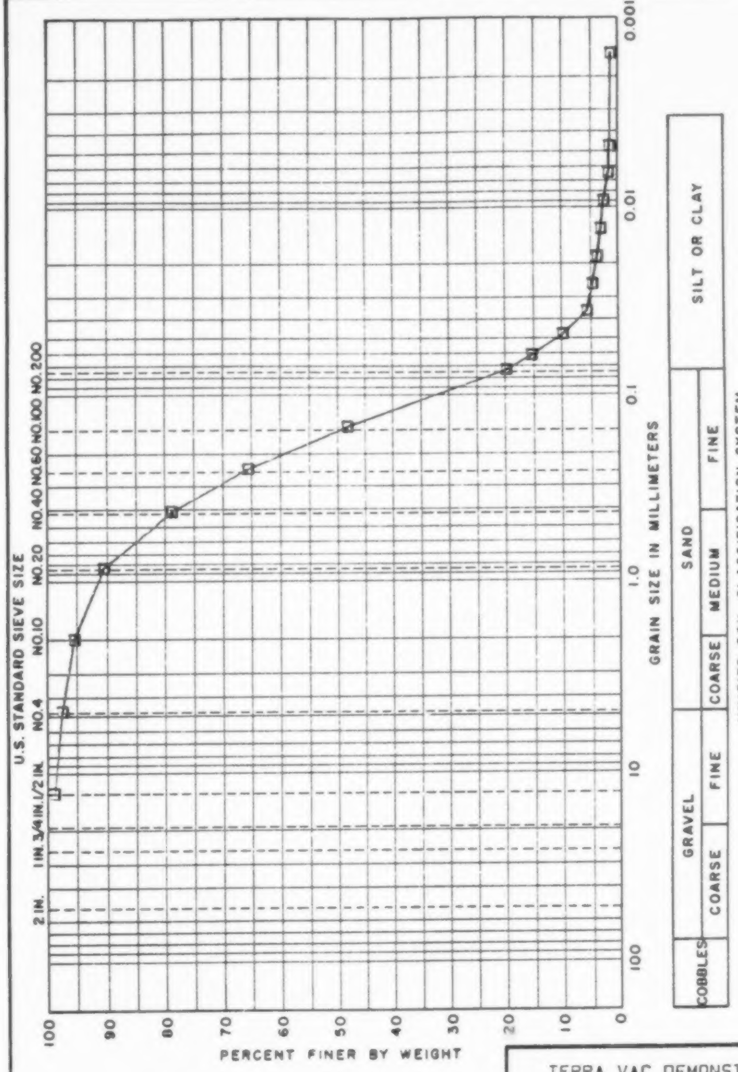
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S13.1	☐	Boring No. EB-2 Sam #3 Depth 4.6-4.8'	Brown f-m SAND, some (-) Silt, trace layers Organic Matter

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

GRADATION TESTS

BORING NO. EB-2
SAMPLE 3
DEPTH 4.6-4.8'
TECH. VST
REVIEWER

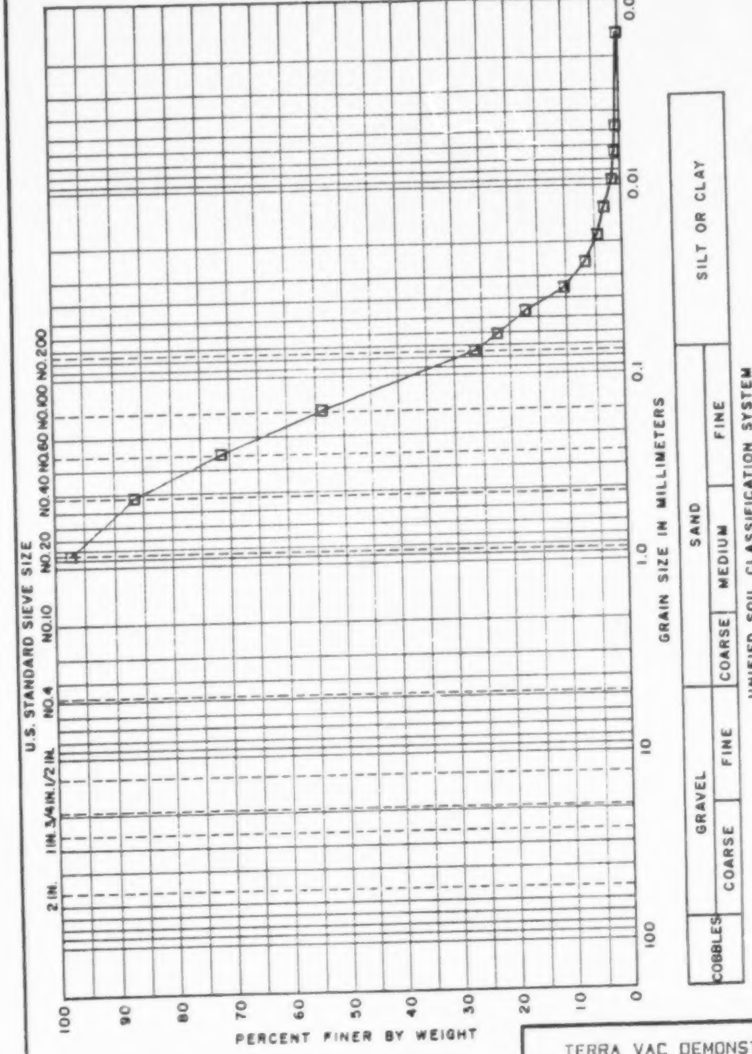
TEST SERIES
NO. 13
DATE Jan 88
L10636

FILE

APPENDIX E-9

S.3

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S14.1	☐	Boring No. EB-2 Sam #4 Depth 7.0-7.3'	Brown f-m SAND, some Silt

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

GRADATION TESTS

BORING NO. EB-2
SAMPLE 4
DEPTH 7.0-7.3'
TECH. MST
REVIEWER

TEST SERIES NO. 14
DATE Jan 88
110636

FILE

S3

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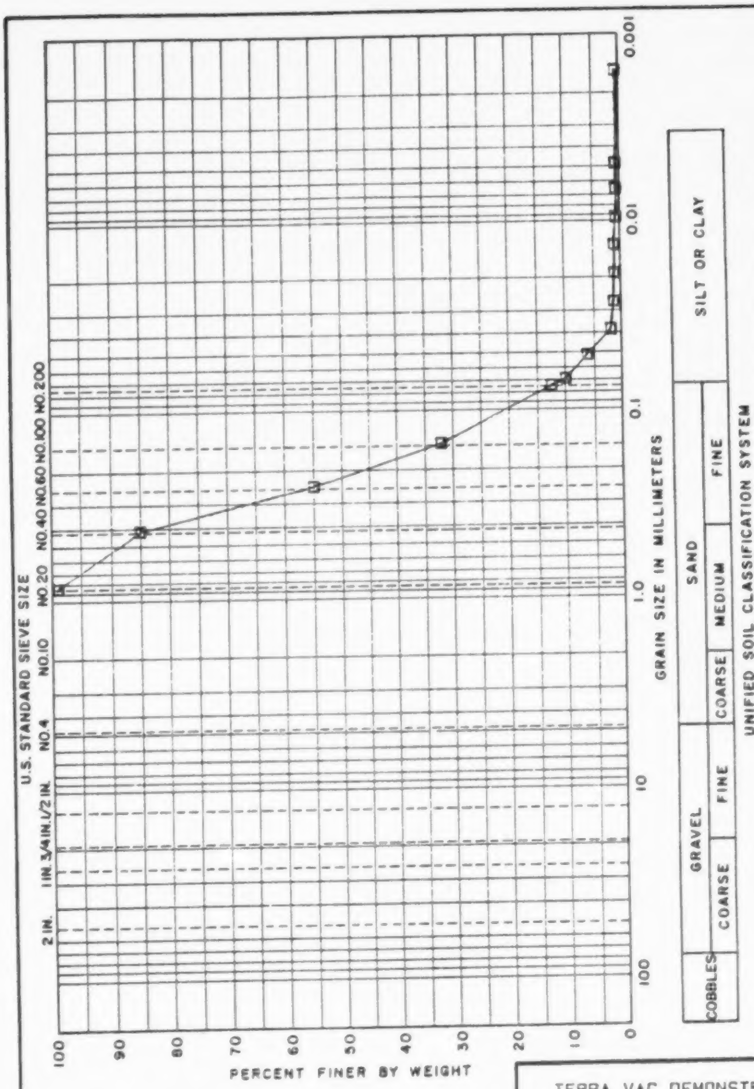
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S15.1	□	Boring No. EB-2 Sam #5 Depth 8.8-9.0'	Brown f-m SAND, little (-) Silt

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

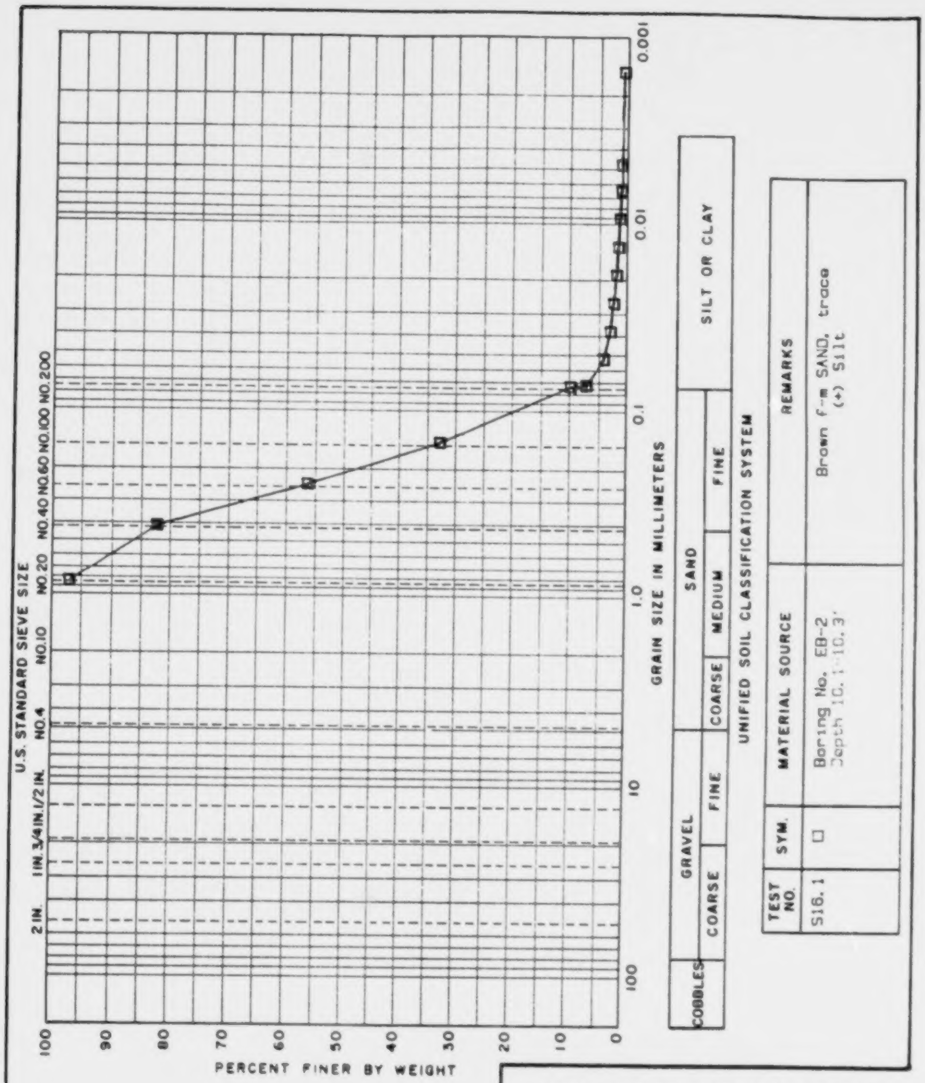
GRADATION TESTS

BORING NO.	EB-2	**TEST SERIES**	
SAMPLE	5	**NO.**	15
DEPTH	8.8-9.0'	**DATE**	Jan 88
TECH.	MST		110636
REVIEWER		**FILE**	

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S3



TERRA-VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

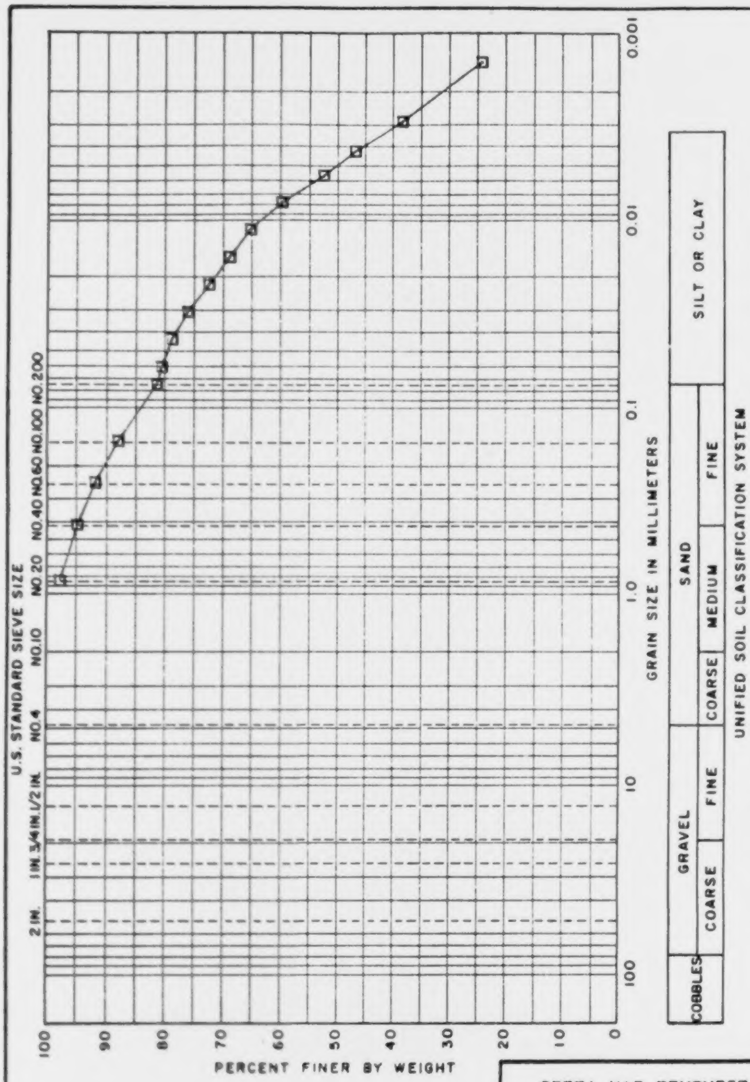
GRADATION TESTS

BORING NO.	EB-2	TEST SERIES NO.	16
SAMPLE	6	DATE	Jan 88
DEPTH	10.1-10.3'		L10636
TECH.	MST		
REVIEWER		FILE	

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S17.1	⊡	Boring No. EB-2 Depth 12.8-13.0'	Olive Grey Silty CLAY, little (+) fine Sand

TERRA VAC DEMONSTRATION PROJ.

GROVELAND, MASS.

GRADATION TESTS

BORING NO. EB-2
SAMPLE 7
DEPTH 12.8-13.0'
TECH. YST
REVIEWER

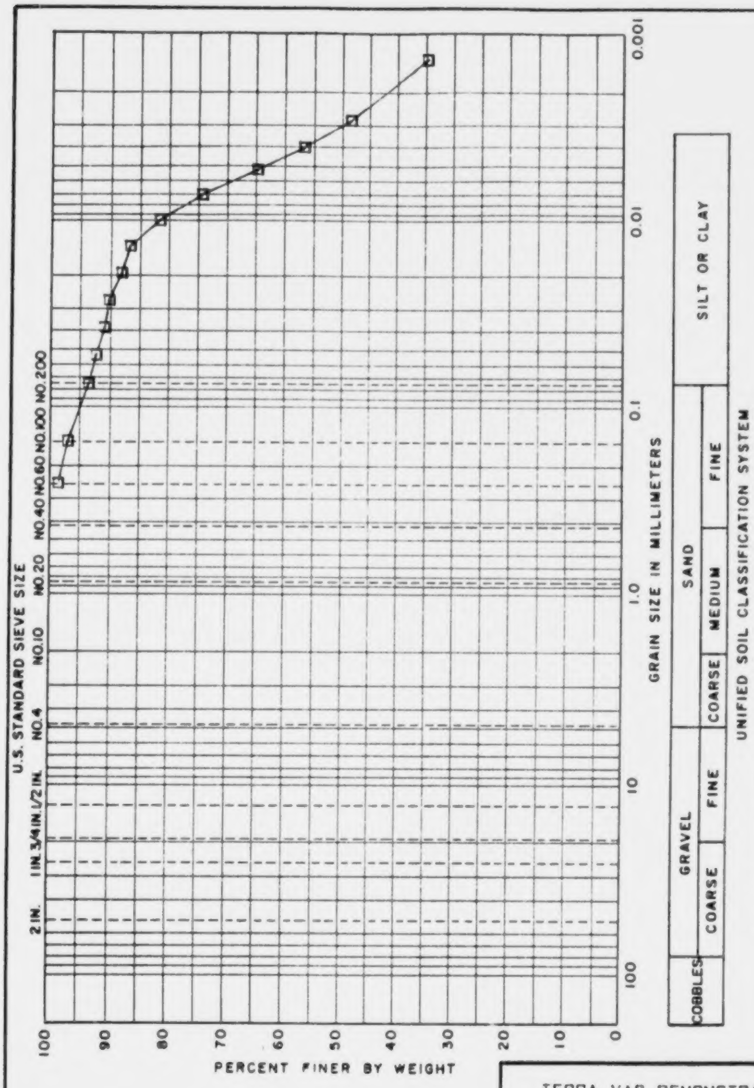
TEST SERIES
NO. 17
DATE Jan 88
L10636

FILE

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S.3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S18.1	☐	Boring No. EB-2 Depth 14.8-15.1'	Olive Gray Silty CLAY, trace fine Sand

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

GRADATION TESTS

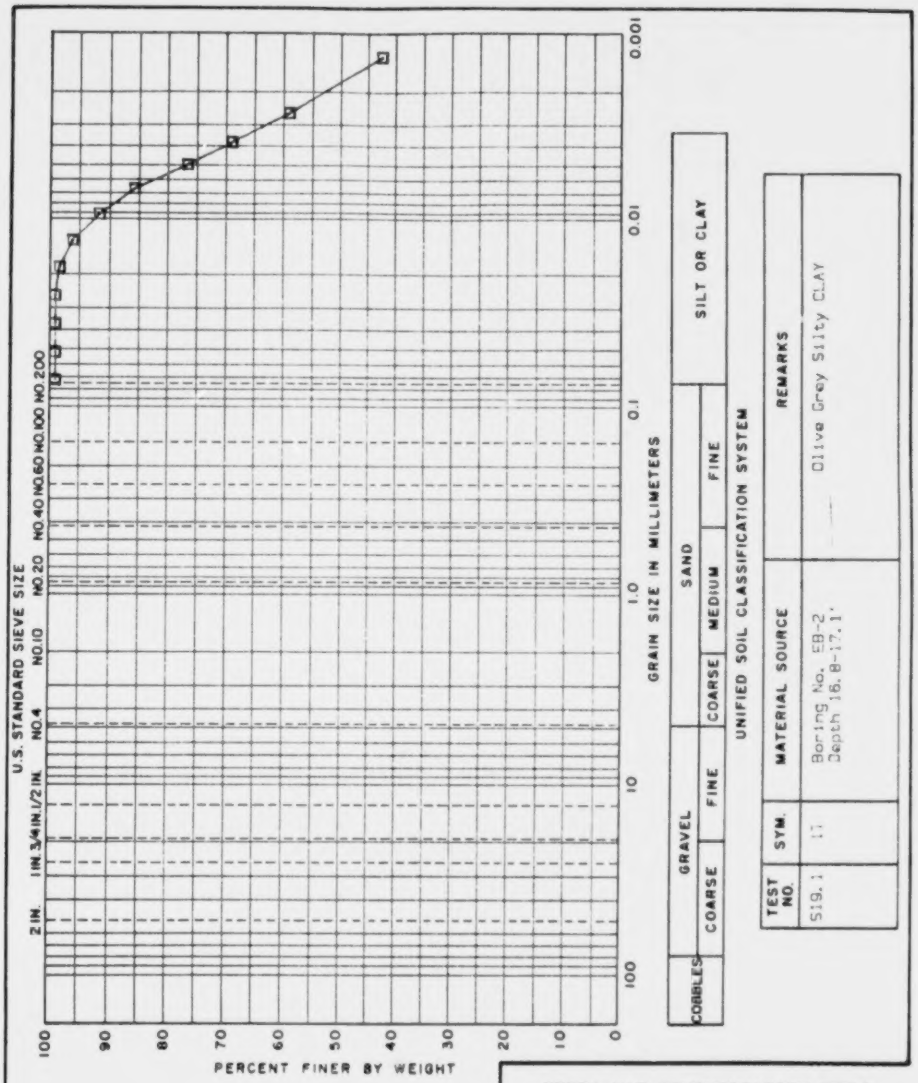
BORING NO. EB-2
SAMPLE 8
DEPTH 14.8-15.1'
TECH. MST
REVIEWER

TEST SERIES
NO. 18
DATE Jan 88
_10636
FILE

APPENDIX E-9

S.3

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS



TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

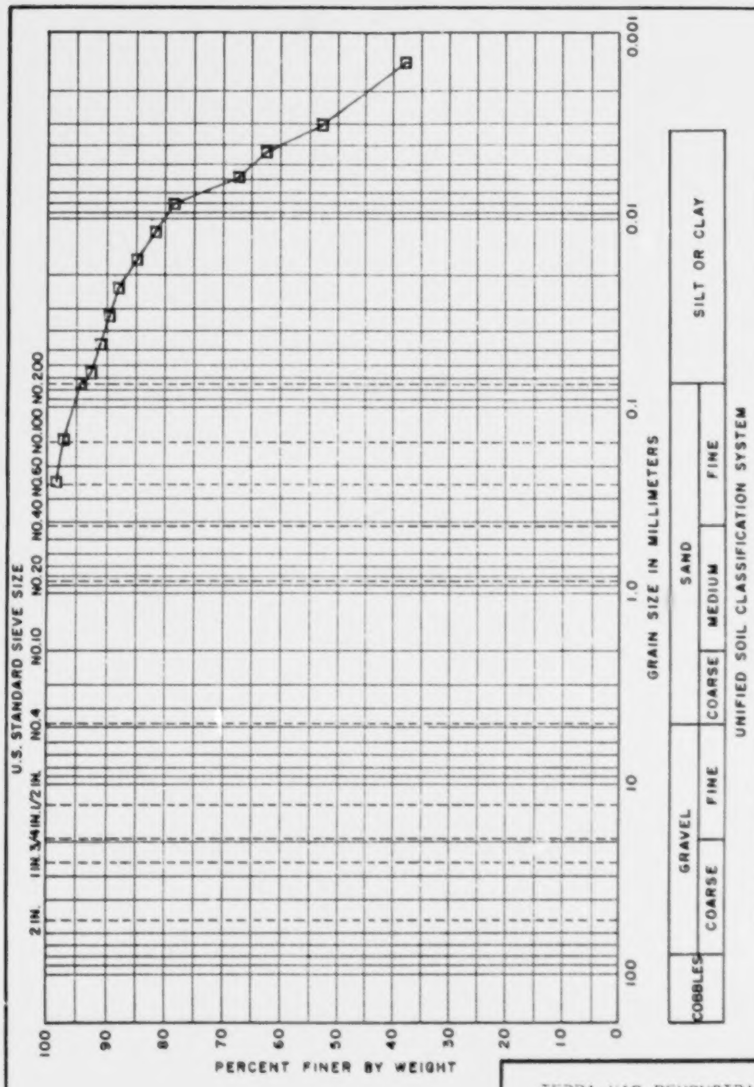
GRADATION TESTS

BORING NO.	EB-2	**TEST SERIES NO.**	19
SAMPLE	9	**DATE**	Jan 88
DEPTH	16.8-17.1'		L10636
TECH.	MST		
REVIEWER		**FILE**	

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S.3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S20.1	□	Boring No. EB-2 Depth 18.0-18.2'	Olive Grey Silty CLAY

TERRA-VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

GRADATION TESTS

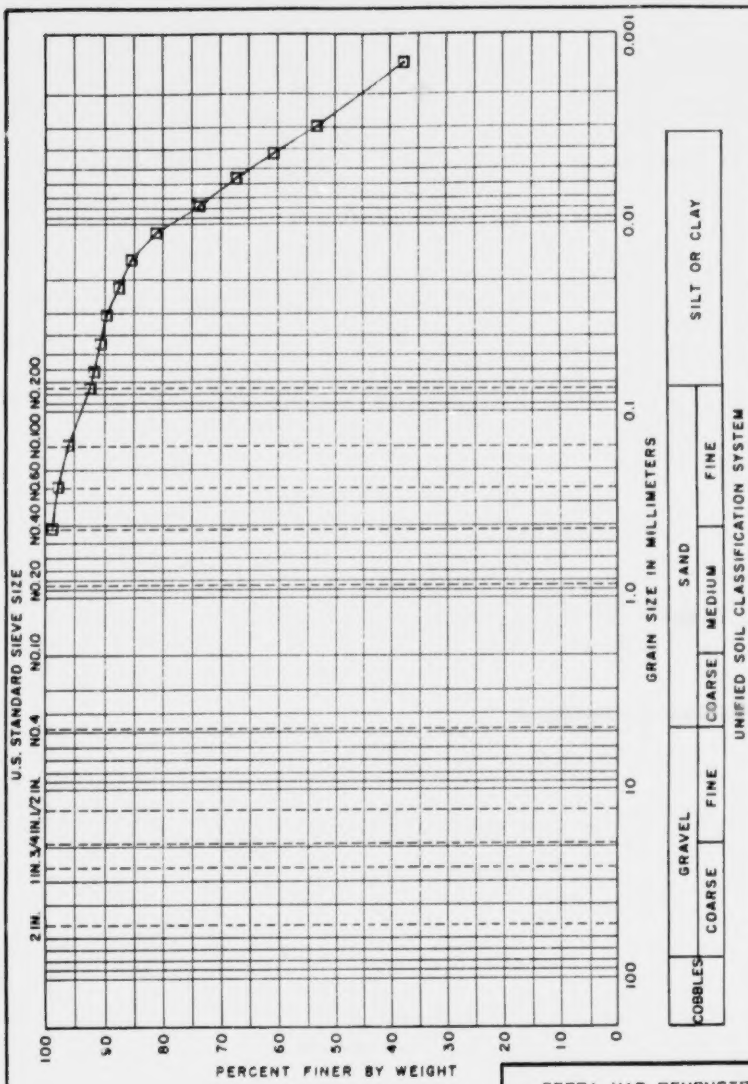
BORING NO. EB-2
SAMPLE 10
DEPTH 18.0-18.2'
TECH. MST
REVIEWER

TEST SERIES NO. 20
DATE Jan 88
L10638
FILE

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S21.1	☐	Boring No. EB-2 Depth 20.0-20.2'	Olive Grey Silty CLAY

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

GRADATION TESTS

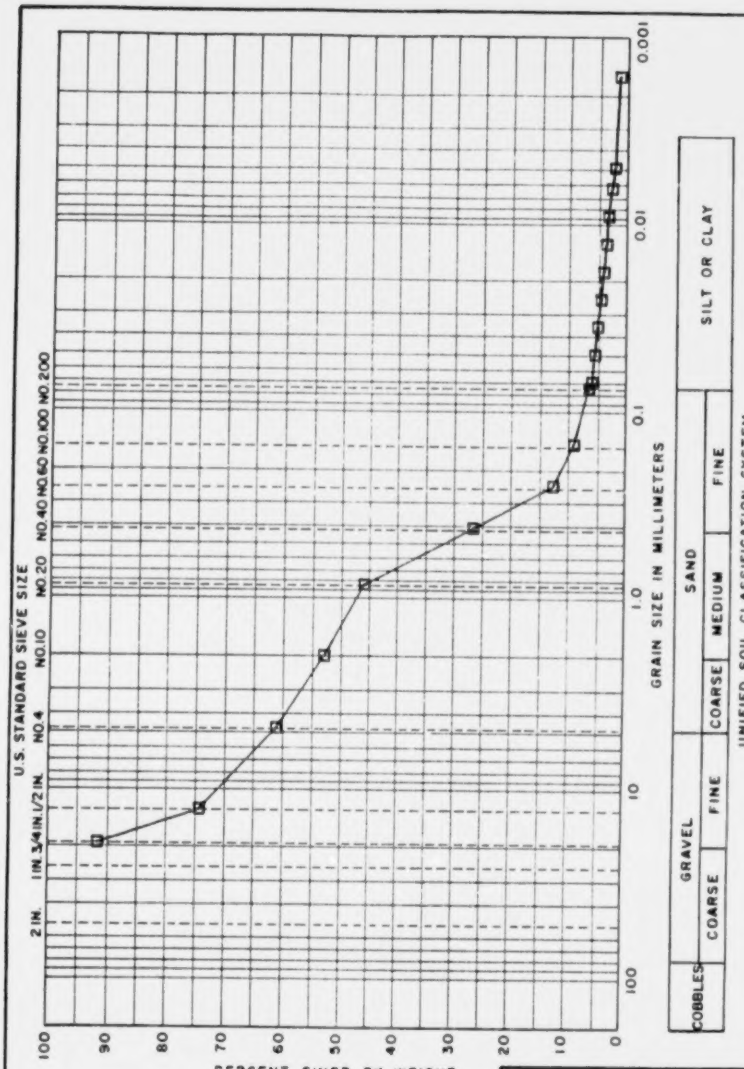
BORING NO. EB-2
SAMPLE 11
DEPTH 20.0-20.2'
TECH. MS1
REVIEWER

TEST SERIES NO. 21
DATE Jan 88
L10636
FILE

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S.3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S22.1	□	Boring No. EB-2 Depth 20.7-21.1'	Brown f-m SAND and f-c GRAVEL, trace Silt

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

GRADATION TESTS

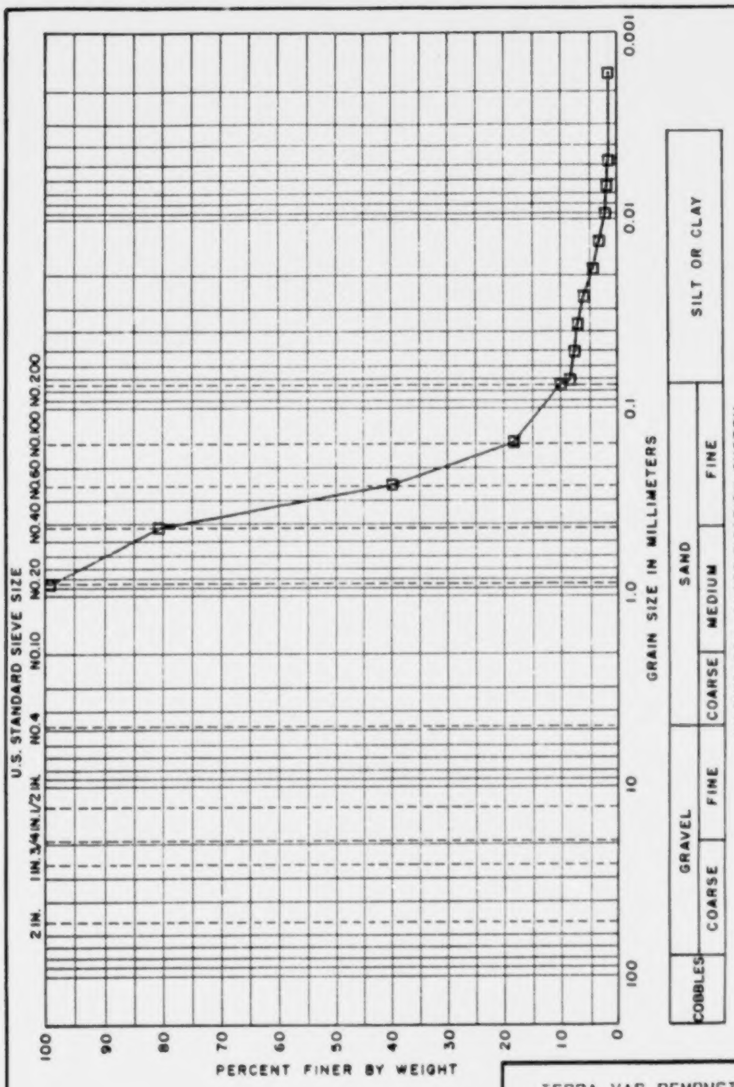
BORING NO. EB-2
SAMPLE 12
DEPTH 20.7-21.1'
TECH. MSI
REVIEWER

TEST SERIES
NO. 22
DATE Jan 88
10638
FILE

APPENDIX E-9

S.3

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S23.1	◻	Boring No. EB-2 Depth 23.7-23.9'	Brown f-m SAND, trace (+) Silt

TERRA VAC DEMONSTRATION PROJ.

GROVELAND, MASS.

GRADATION TESTS

BORING NO. EB-2
SAMPLE 13
DEPTH 23.7-23.9'
TECH. MSI
REVIEWER

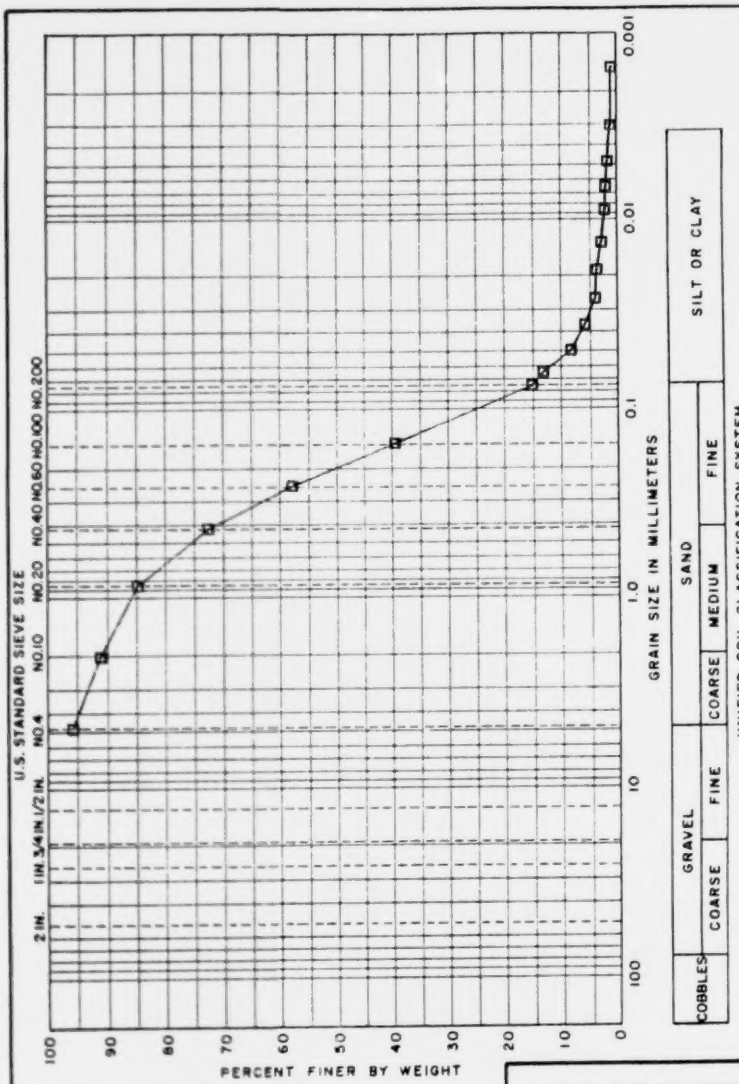
TEST SERIES
NO. 23
DATE Jan 88
L10638

FILE

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S24.1	☐	Boring No. EB-3 Depth 3.0-9.0"	Brown f-m SAND, trace fine Gravel, little Silt

TERRA VAC DEMONSTRATION PROJ.

GROVELAND, MASS.

GRADATION TESTS

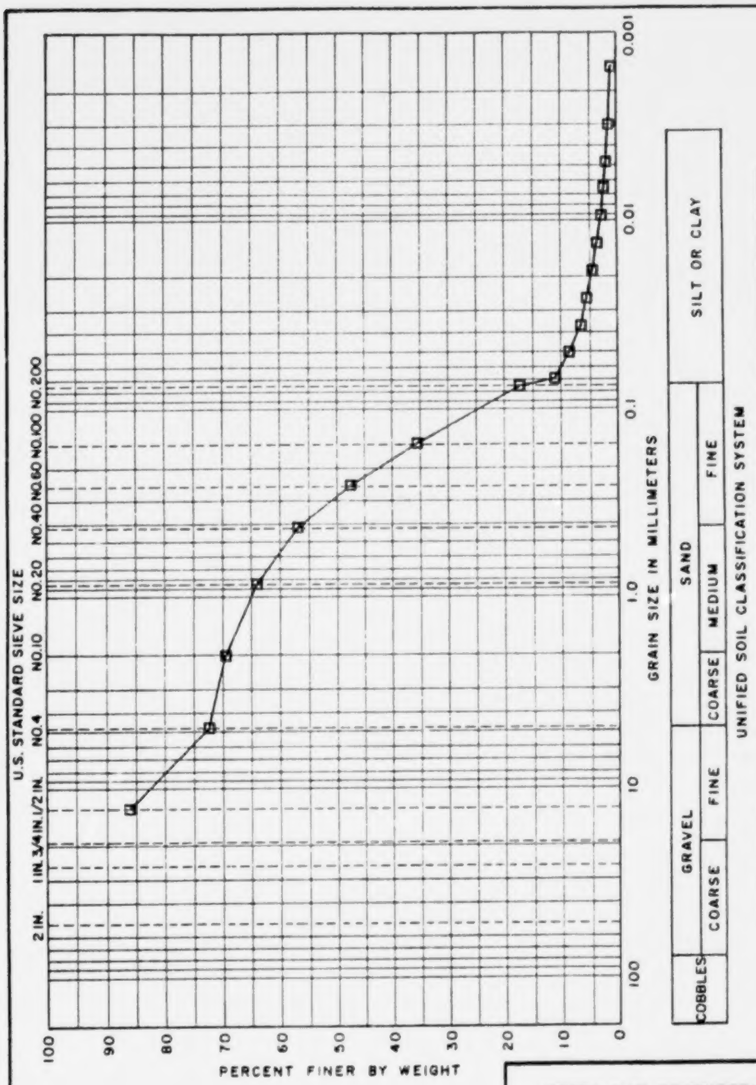
BORING NO. EB-3
SAMPLE 1
DEPTH 3.0-9.0"
TECH. [illegible]
REVIEWER

TEST SERIES NO. 24
DATE May 88
[illegible]
FILE

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S.3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S25.1	□	Boring No. EB-3 Depth 20.0-24.0"	Brown f-m SAND, some fine Gravel, little Silt

TERRA VAC DEMONSTRATION PROJ.

GROVELAND, MASS.

GRADATION TESTS

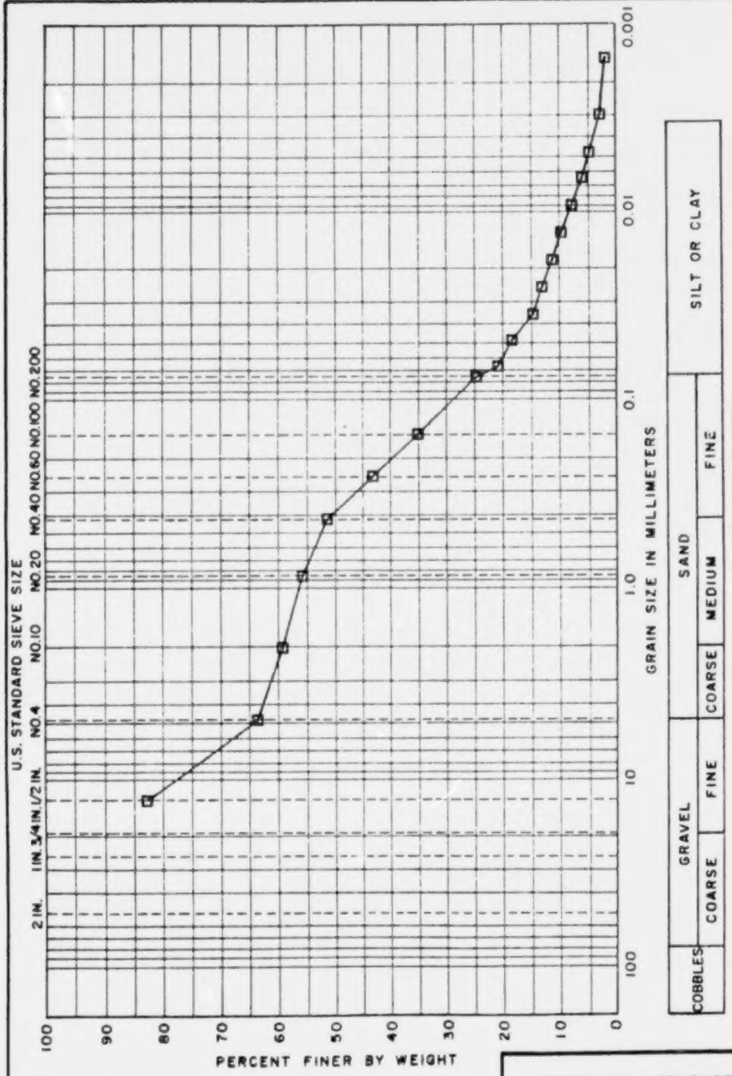
BORING NO. EB-3
SAMPLE 2
DEPTH 20.0-24.0"
TECH. [illegible]
REVIEWER

TEST SERIES
NO. 25
DATE May 88
L10636
FILE

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S.3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S26.1	☐	Boring No. EB-3 Depth 45.0-48.0'	Brown f-m SAND and fine GRAVEL, some Silt, trace Glass, coal

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

GRADATION TESTS

BORING NO. EB-3
SAMPLE 3
DEPTH 45.0-48.0'
TECH. [illegible]
REVIEWER

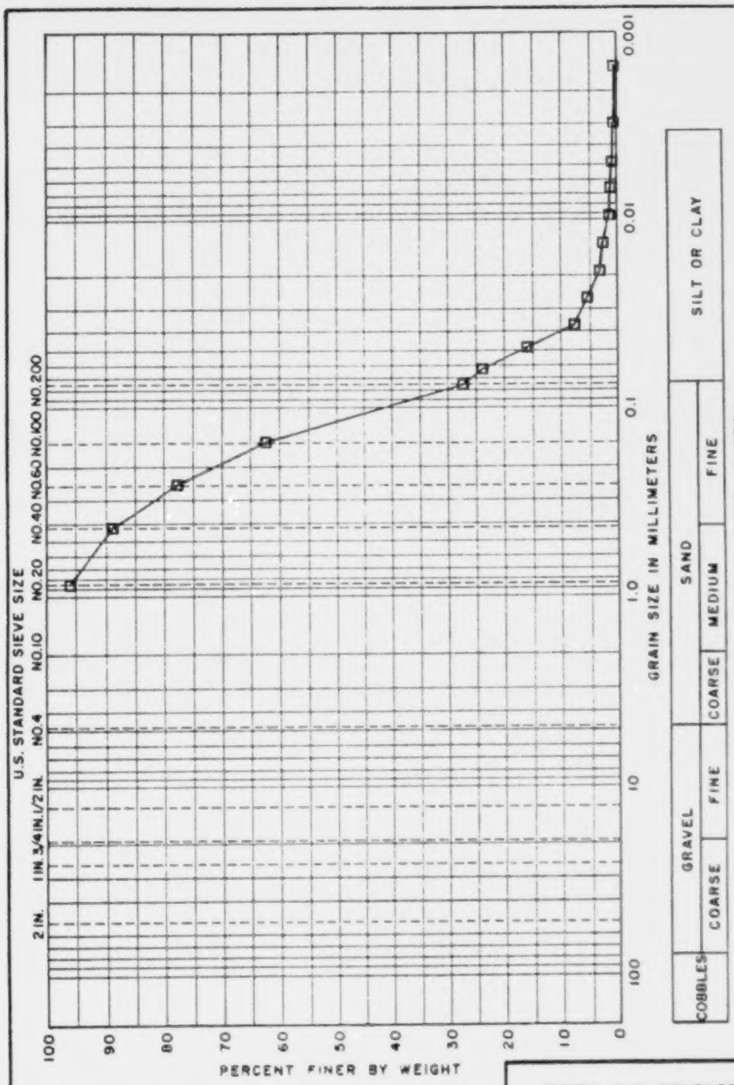
TEST SERIES
NO. 26
DATE May 88
[illegible]

FILE

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S.3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S27.1	☐	Boring No. EB-3 Depth 78.0-81.0'	Brown f-m SAND, some Silt, trace Roots

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

GRADATION TESTS

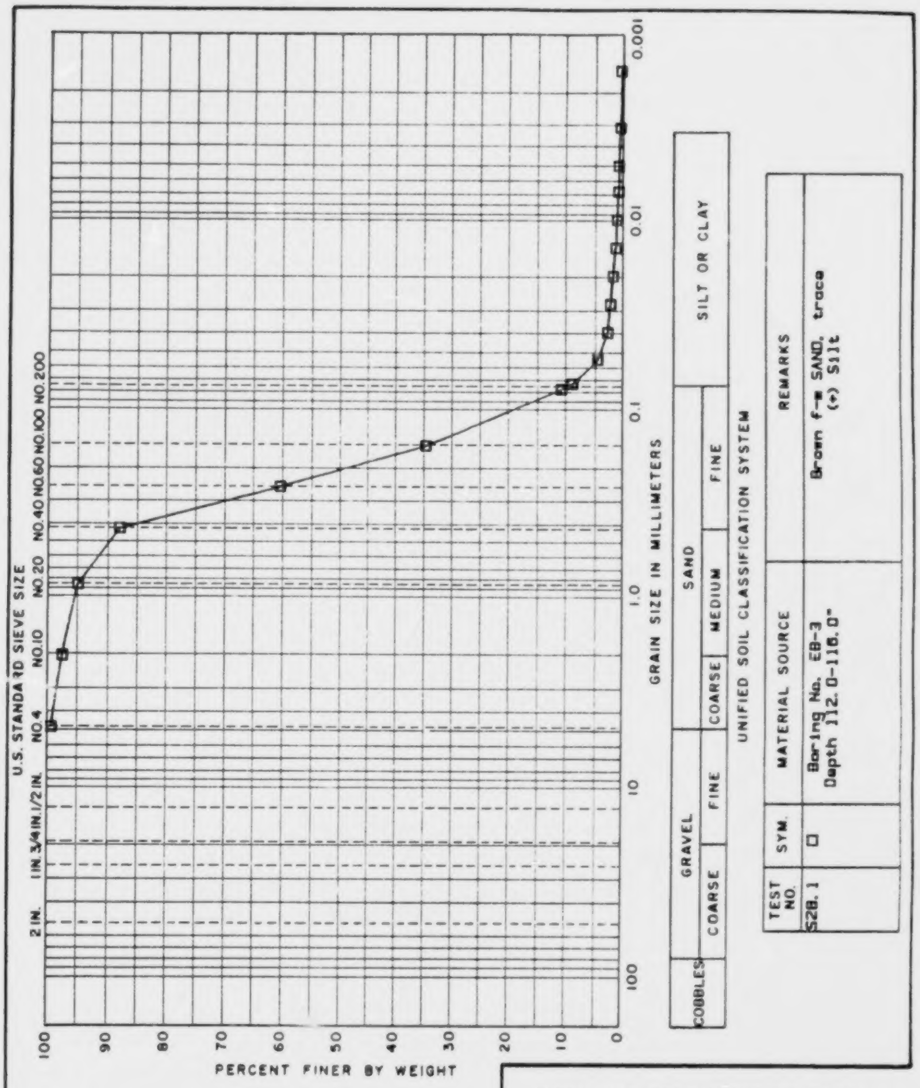
BORING NO. EB-3
SAMPLE 4
DEPTH 78.0-81.0"
TECH. [illegible]
REVIEWER

TEST SERIES
NO. 27
DATE May 88
[illegible]
FILE

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S28.1	☐	Boring No. EB-3 Depth 112.0-118.0"	Brown f-m SAND, trace (+) Silt

TERRA VAC DEMONSTRATION PROJ.

GROVELAND, MASS.

GRADATION TESTS

BORING NO. EB-3
SAMPLE 5
DEPTH 112.0-118.0"
TECH. BEF
REVIEWER

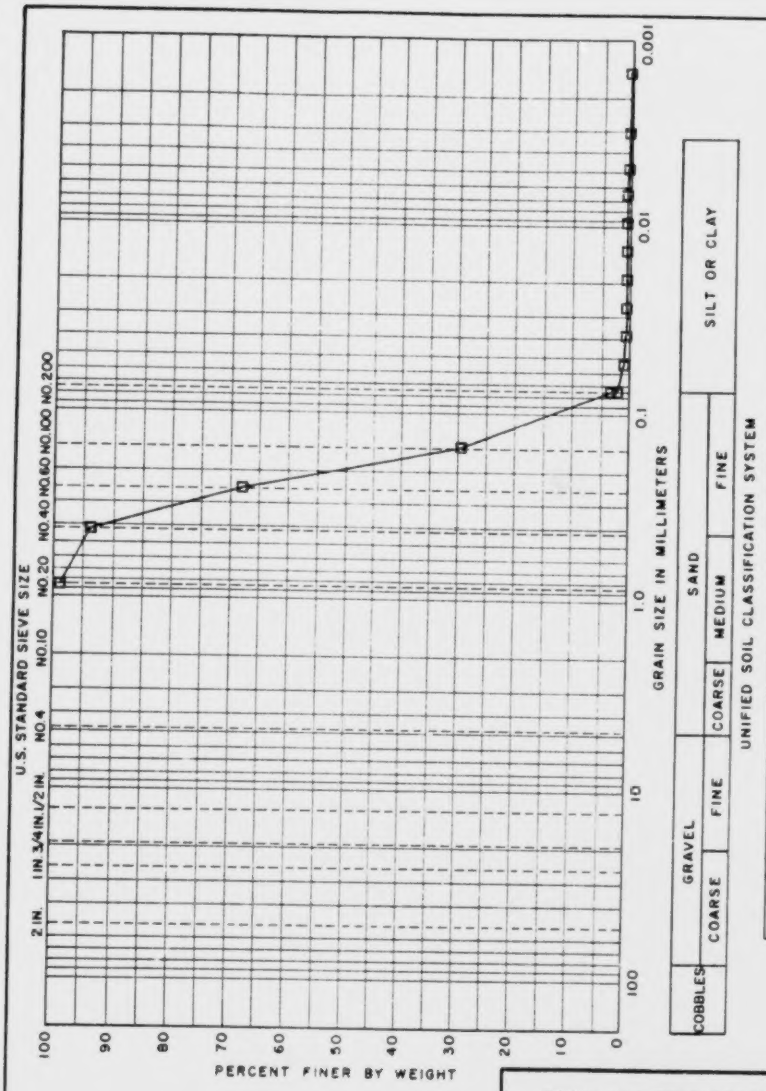
TEST SERIES
NO. 28
DATE May 88
110838

FILE

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S29.1	☐	Boring No. EB-3 Depth 131.0-134.0"	Brown fine SAND, trace (-) Silt

TERRA VAC DEMONSTRATION PROJ.

GROVELAND, MASS.

GRADATION TESTS

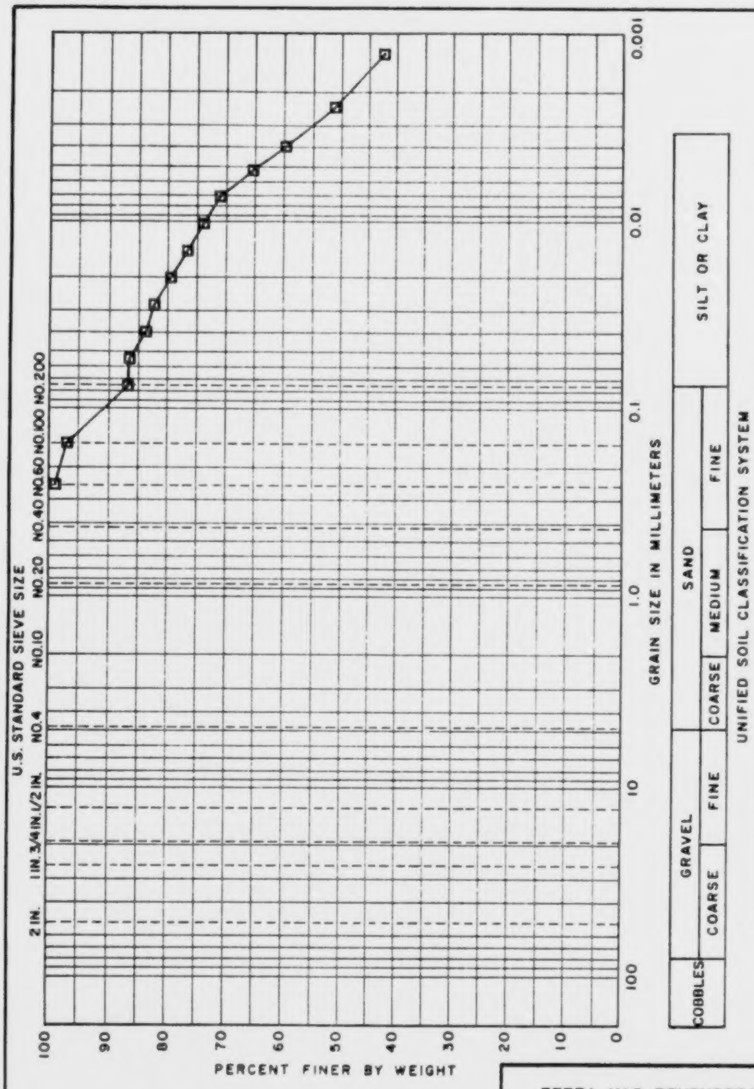
BORING NO. EB-3
SAMPLE 8
DEPTH 131.0-134.0"
TECH. [illegible]
REVIEWER

TEST SERIES NO. 29
DATE May 88
[illegible]
FILE

APPENDIX E-9

S3

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S30.1	☐	Boring No. EB-3 Depth 168.0-172.0"	Olive Grey CLAY & SILT little (-) fine Sand

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

GRADATION TESTS

BORING NO. EB-3
SAMPLE 7
DEPTH 168.0-172.0"
TECH. [illegible]
REVIEWER

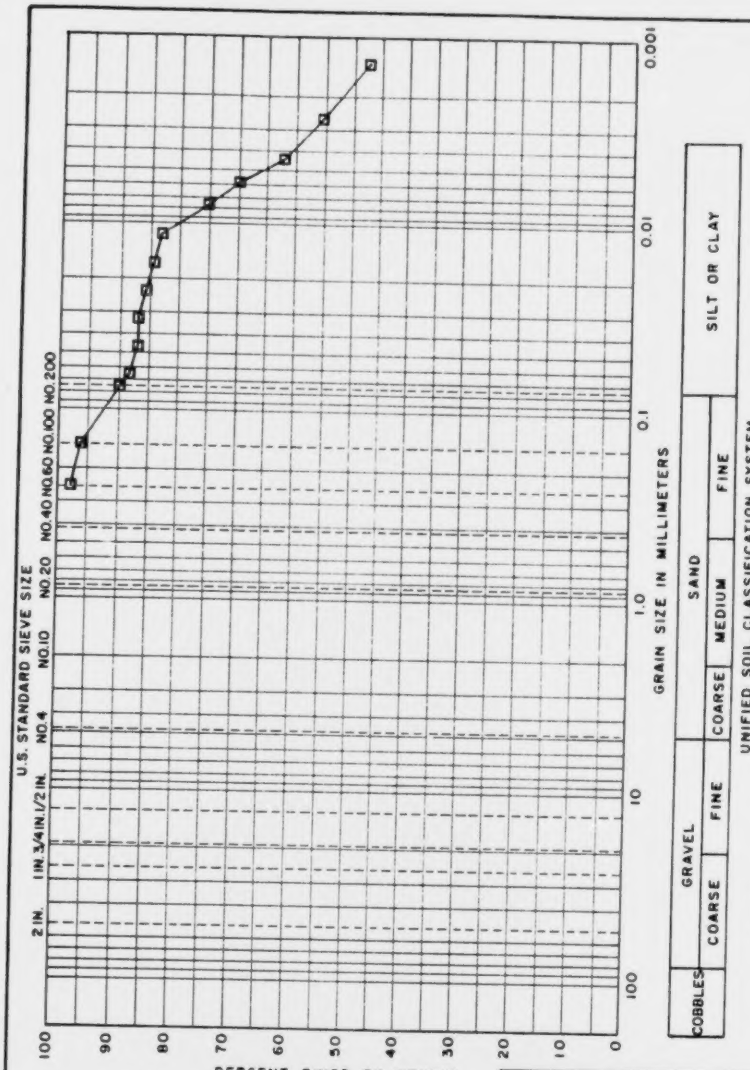
TEST SERIES
NO. 30
DATE May 88
[illegible]

FILE

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S.3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S31.1	□	Boring No. EB-3 Depth 192.0-198.0"	Olive Grey CLAY & SILT trace (+) fine Sand

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

GRADATION TESTS

BORING NO. EB-3
SAMPLE 8
DEPTH 192.0-198.0"
TECH. DCF
REVIEWER

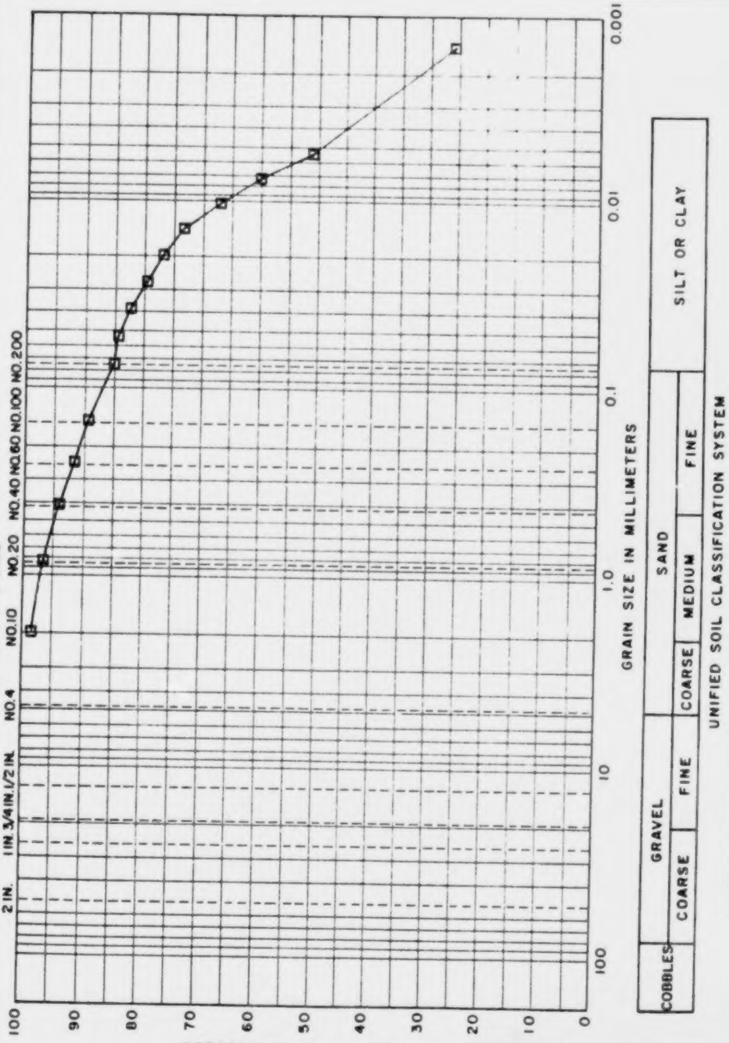
TEST SERIES
NO. 31
DATE May 88
110838

FILE

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S.3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S32.1	☐	Boring No. EB-3 Depth 227-228 in	Olive Grey CLAY & SILT, little fine Sand lenses

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

GRADATION TESTS

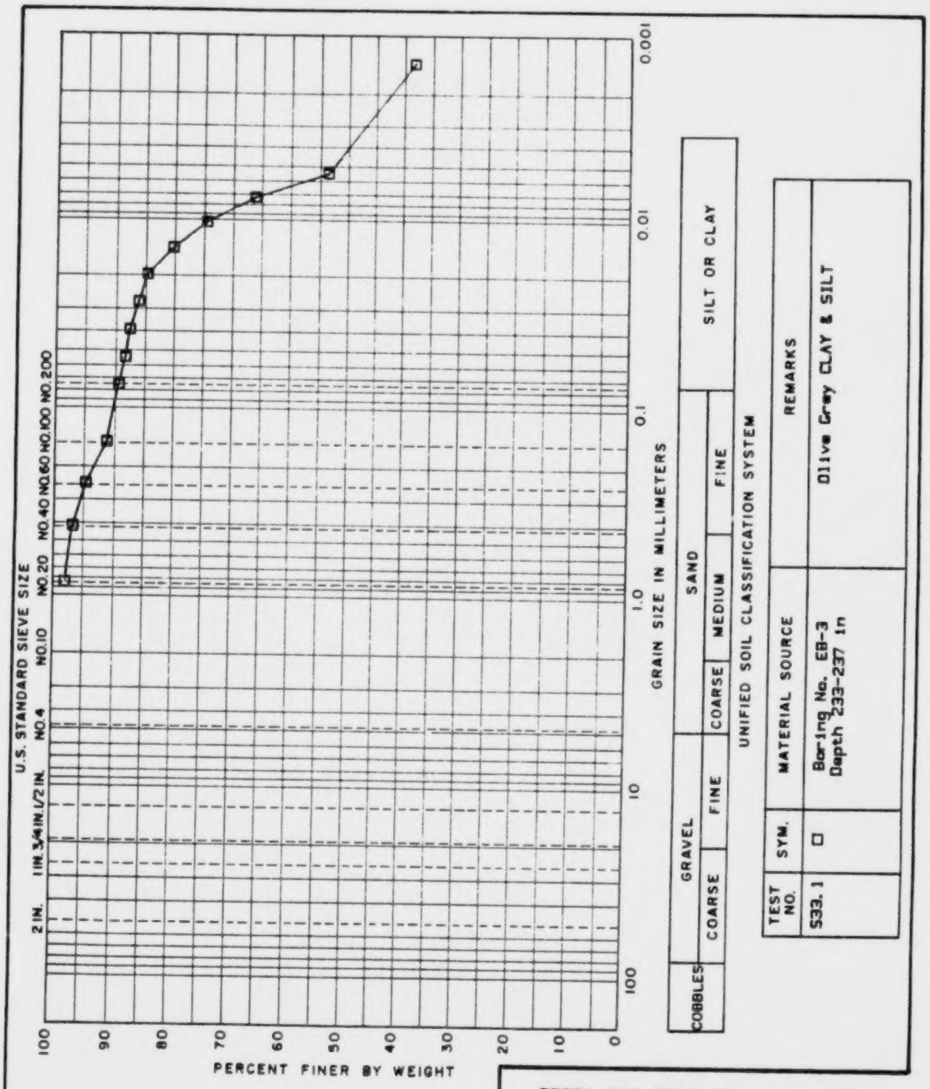
BORING NO. EB-3
SAMPLE 9
DEPTH 227-228 in
TECH. MST
REVIEWER

TEST SERIES NO. 32
DATE May 88
L10628
FILE

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S.3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S33.1	☐	Boring No. EB-3 Depth 233-237 in	Olive Grey CLAY & SILT

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

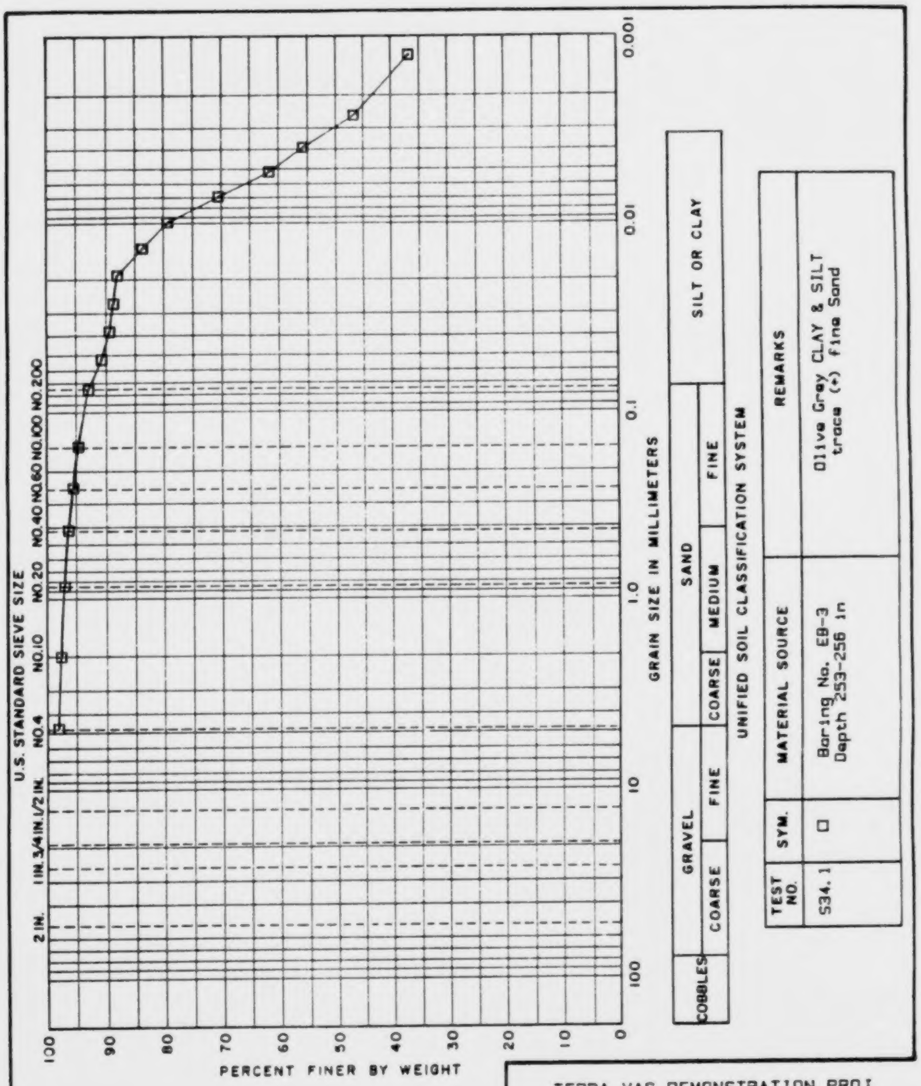
GRADATION TESTS

BORING NO.	EB-3	TEST SERIES NO.	33
SAMPLE	10	DATE	May 88
DEPTH	233-237 in		L10836
TECH.	KST		
REVIEWER		FILE	

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S.3



TERRA VAC DEMONSTRATION PROJ.
GROVELAND. MASS.

GRADATION TESTS

BORING NO. EB-3
SAMPLE 11
DEPTH 253-256 in
TECH. MST
REVIEWER

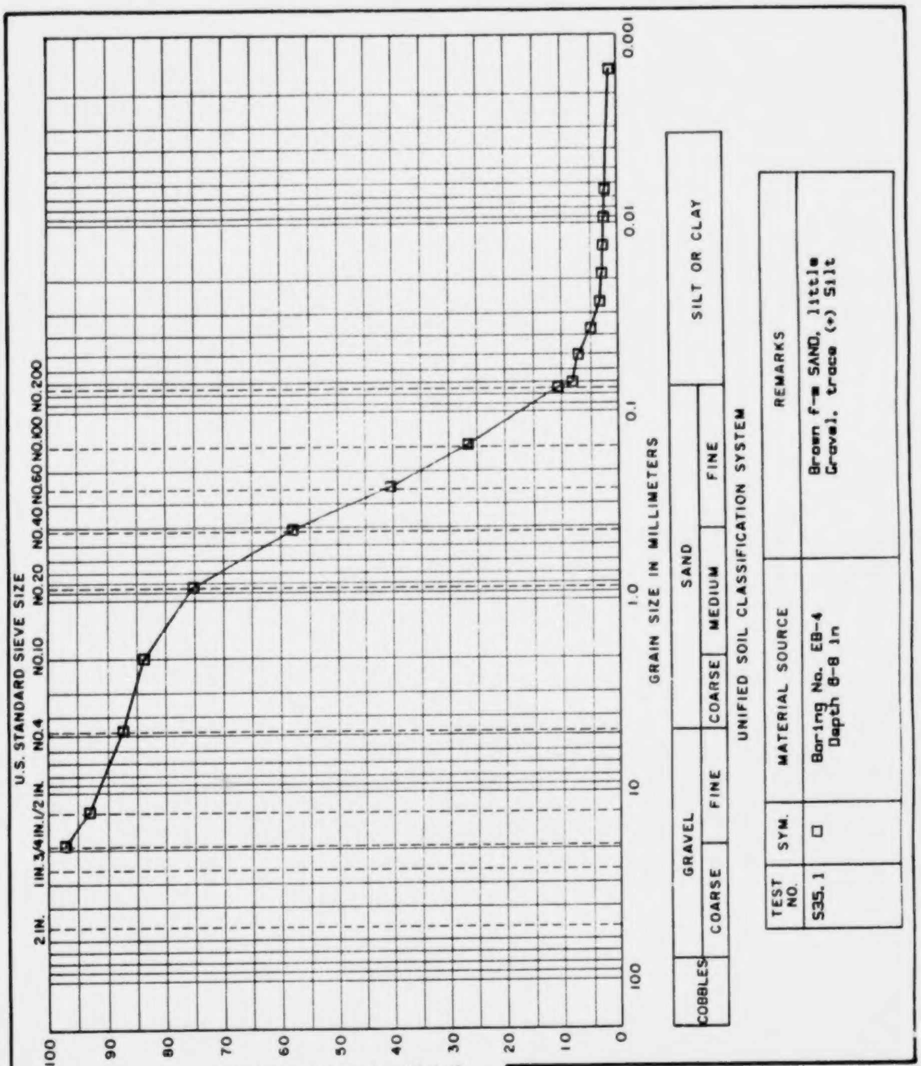
TEST SERIES NO. 34
DATE May 88
L10636

FILE

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S.3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S35.1	□	Boring No. EB-4 Depth 6-8 In	Brown f-m SAND, little Gravel, trace (+) Silt

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

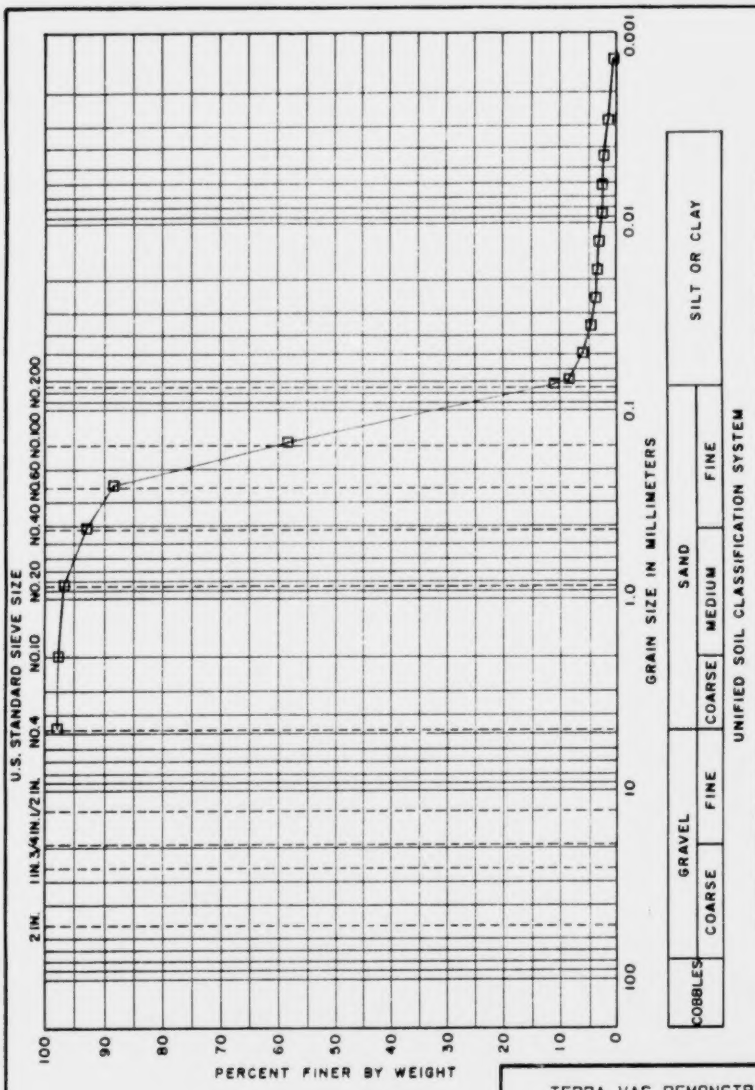
GRADATION TESTS

BORING NO.	EB-4	TEST SERIES NO.	35
SAMPLE	1	DATE	May 88
DEPTH	6-8 in		L10628
TECH.	MST		
REVIEWER		FILE	

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S36. 1	□	Boring No. EB-4 Depth 38-43 in	Brown fine SAND, little (-) Silt

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

GRADATION TESTS

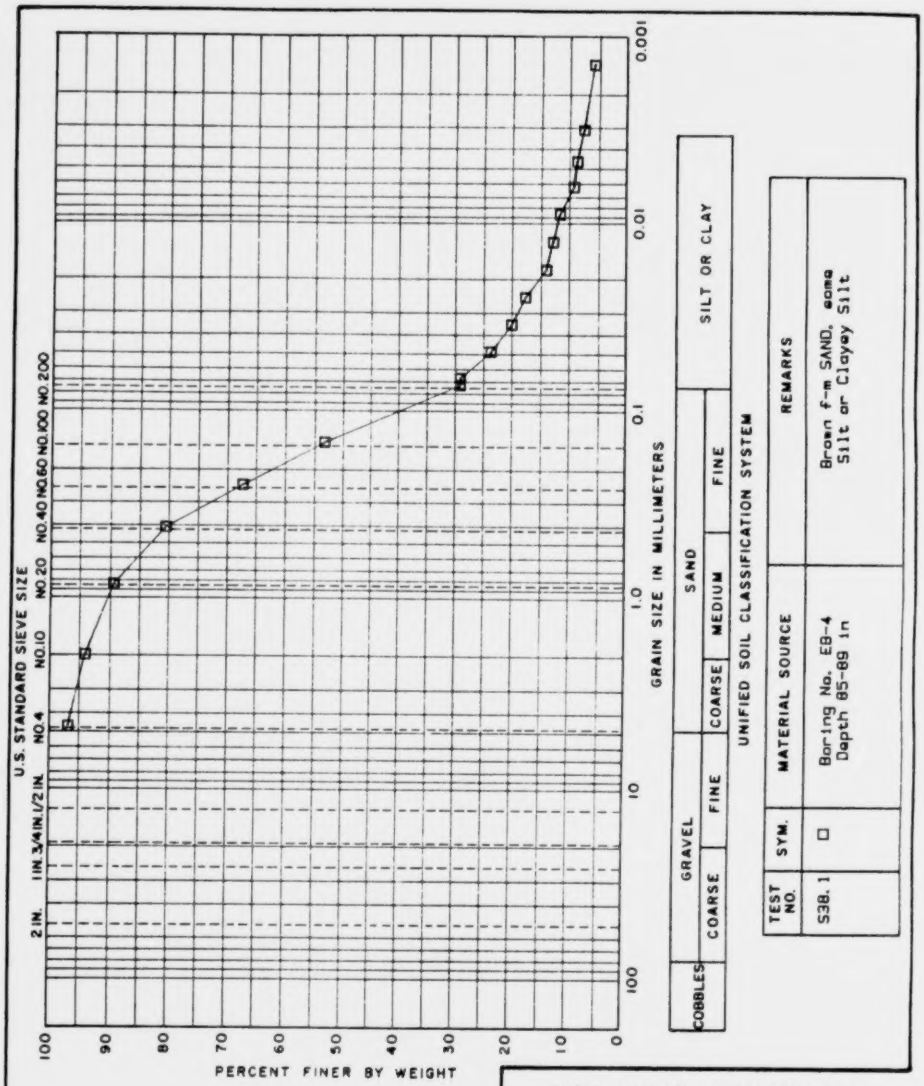
BORING NO. EB-4
SAMPLE 2
DEPTH 38-43 in
TECH. MST
REVIEWER

TEST SERIES NO. 36
DATE May 88
L10836
FILE

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S.3



TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

GRADATION TESTS

BORING NO. EB-4
SAMPLE 4
DEPTH 85-89 in
TECH. MST
REVIEWER

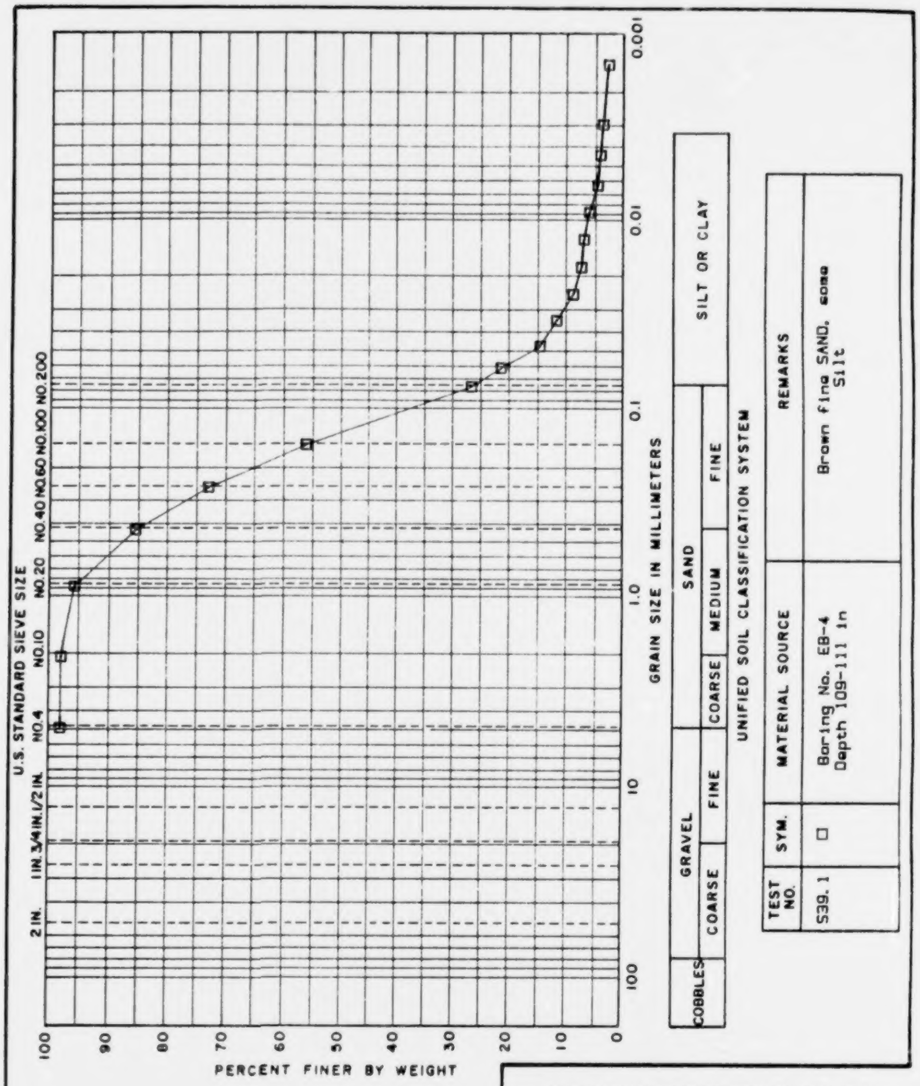
TEST SERIES NO. 38
DATE May 88
L10838

FILE

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S.3



TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

GRADATION TESTS

BORING NO. EB-4
SAMPLE 5
DEPTH 109-111 in
TECH. MST
REVIEWER

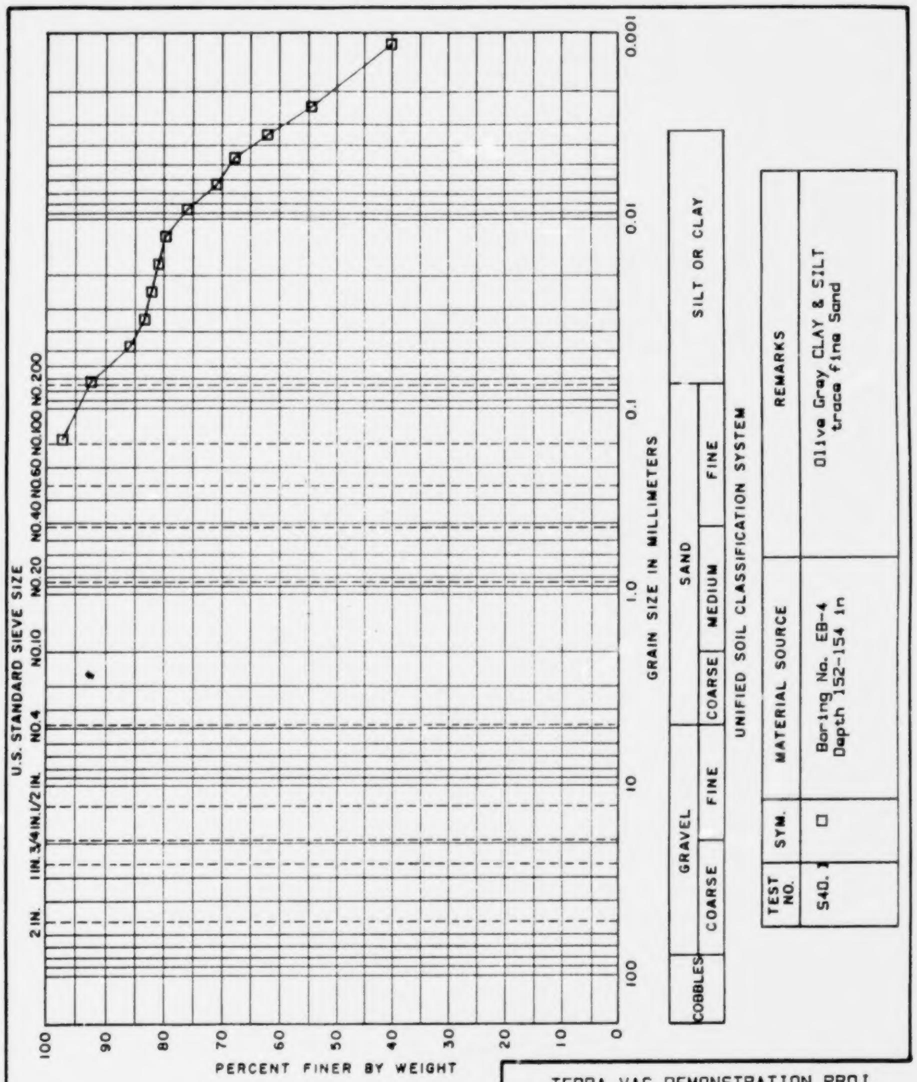
TEST SERIES
NO. 39
DATE May 88
L10636

FILE

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S.3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S40.1	☐	Boring No. EB-4 Depth 152-154 in	Olive Gray CLAY & SILT trace fine Sand

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

GRADATION TESTS

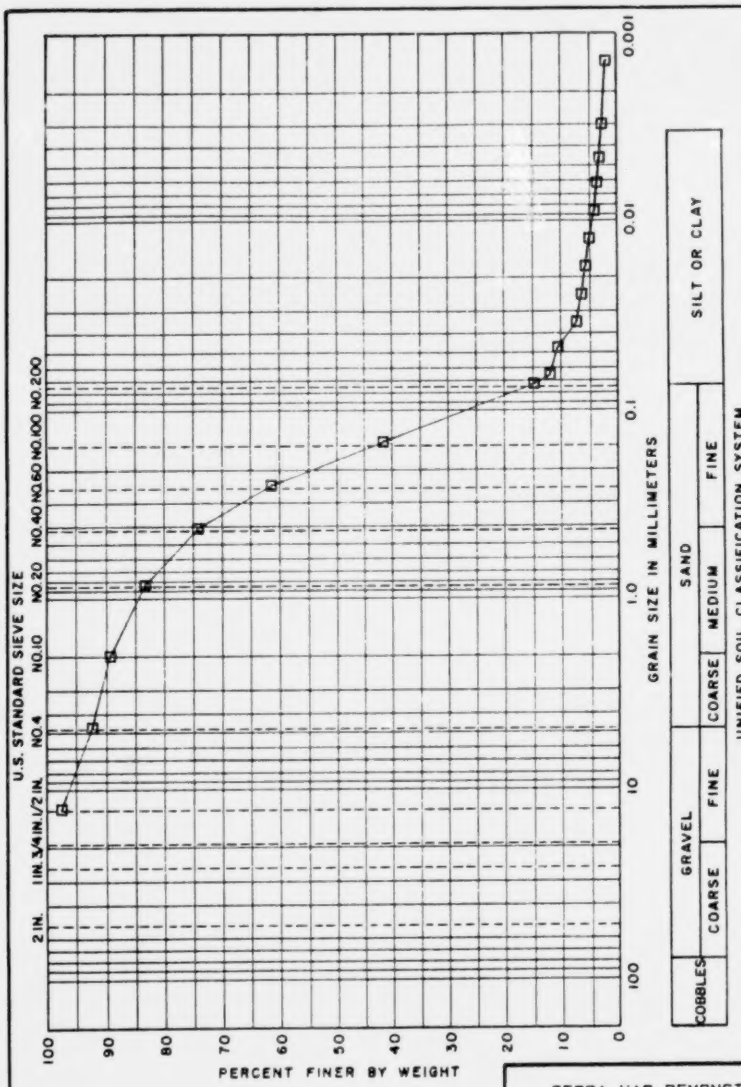
BORING NO. EB-4
SAMPLE 7
DEPTH 152-154 in
TECH. MST
REVIEWER

TEST SERIES 80
NO.
DATE May 88
L10638
FILE

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S.3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S41.1	□	Boring No. EB-4 Depth 170-175 in	Brown f-m SAND, trace fine Gravel, little Silt

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

GRADATION TESTS

BORING NO. EB-4
SAMPLE 8
DEPTH 170-175 in
TECH. MST
REVIEWER

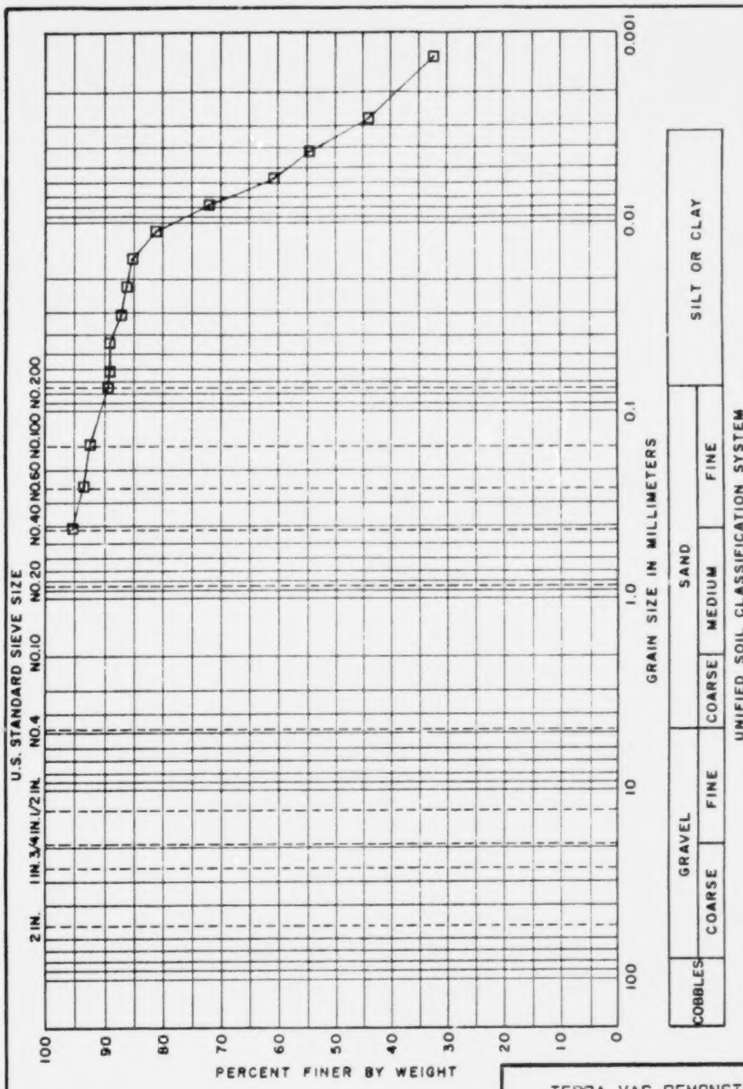
TEST SERIES NO. 41
DATE May 88
L10636

FILE

APPENDIX E-9

S3

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S42.1	□	Boring No. EB-4 Depth 197-200 in	Olive Gray CLAY & SILT trace (+) fine Sand

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

GRADATION TESTS

BORING NO. EB-4
SAMPLE 8A
DEPTH 197-200 in
TECH. MST
REVIEWER

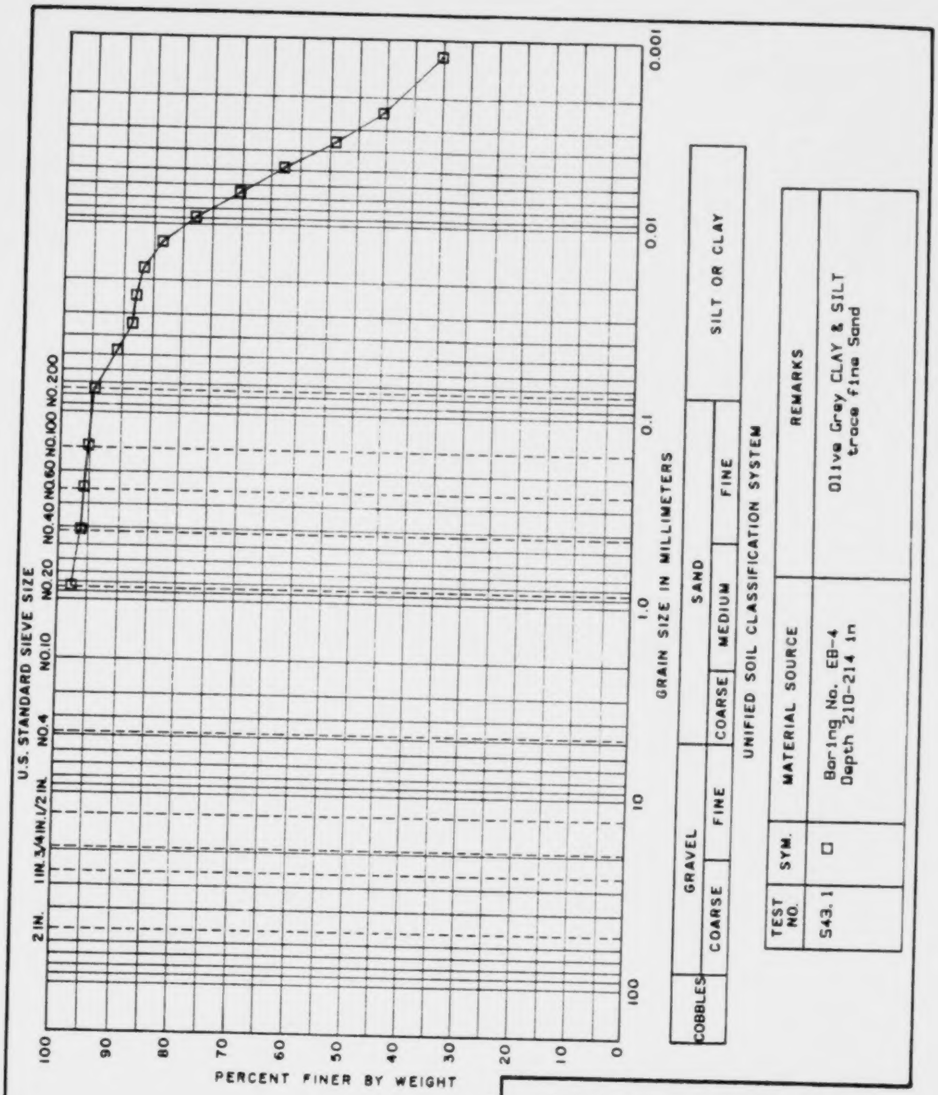
TEST SERIES NO. 42
DATE May 88
L10636

FILE

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S.3



TERRA VAC DEMONSTRATION PROJ.
GROVELAND. MASS.

GRADATION TESTS

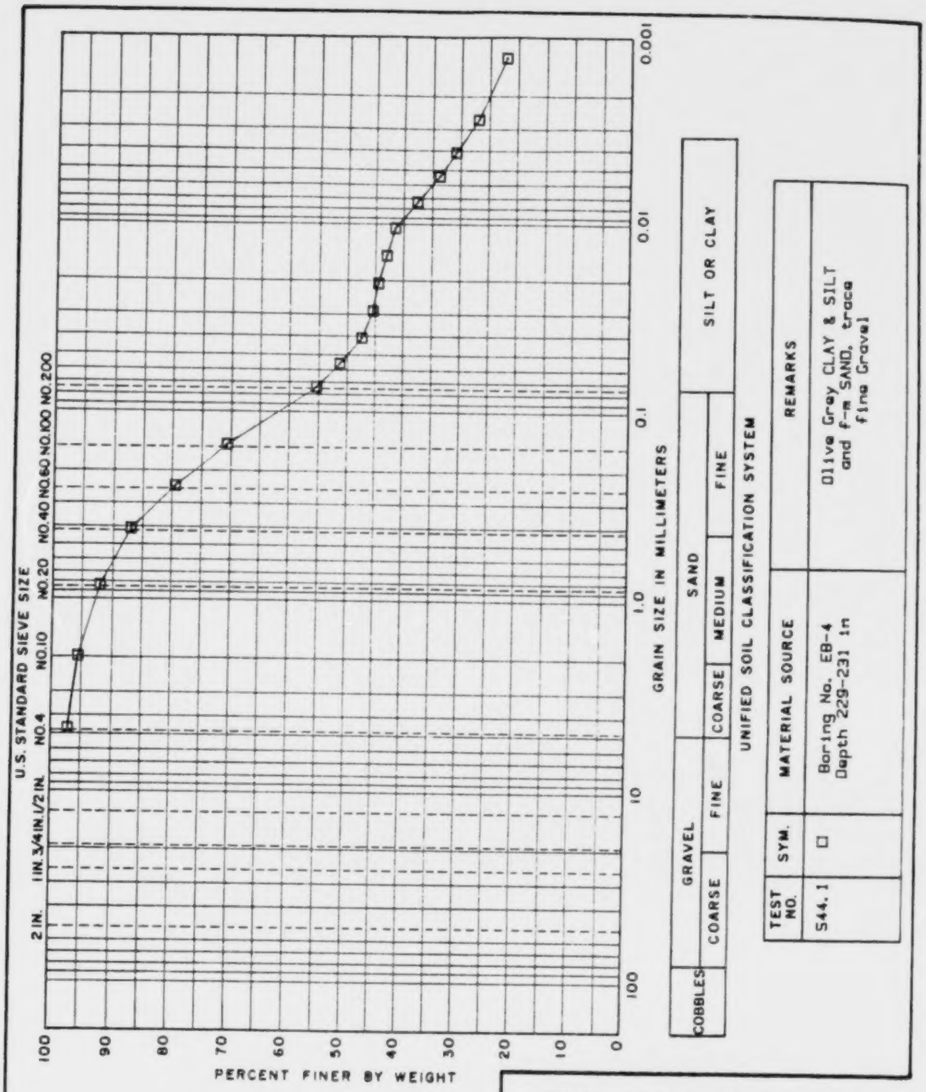
BORING NO. EB-4
SAMPLE 9
DEPTH 210-214 in
TECH. MST
REVIEWER

TEST SERIES NO. 43
DATE May 88
L10638
FILE

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S.3



TEST NO.	SYM.	MATERIAL SOURCE	REMARKS
S44.1	□	Boring No. EB-4 Depth 229-231 in	Olive Gray CLAY & SILT and f-m SAND, trace fine Gravel

TERRA VAC DEMONSTRATION PROJ.
GROVELAND, MASS.

GRADATION TESTS

BORING NO. EB-4
SAMPLE 10
DEPTH 229-231 in
TECH. MST
REVIEWER

TEST SERIES NO. 44
DATE May 88
L10838
FILE

GOLDBERG-ZOINO & ASSOCIATES, INC.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

APPENDIX E-9

S3

APPENDIX D

SHALLOW SOIL GAS SAMPLES

Shallow Soil Gas Samples

Samples were collected to monitor the shallow soil gas concentrations on three occasions during this project corresponding with pre, mid and post treatment activities. Shallow vacuum monitoring wells (1-4) and twelve shallow punch bar tubes were used at sample locations. The punch bar samples were collected from hollow stainless steel probes that had been driven to a depth of 3 to 5 feet. As with the vacuum wells, soil gas was drawn up the punch bar probes with a low volume personal pump and tygon tubing. Gas tight 50 ml syringes were used to collect the sample out of the tygon tubing.

The twelve punch bar probes were placed in approximately the same location on each sampling phase (pre, mid, post). This was accomplished by setting up a coordinate system around the main extraction well and recording the location of the punch bar probes. The grid was established by using extraction well #1 as the origin (0,0). While facing the building, the positive x axis was in the direction of east and the negative x axis was in the direction of west. The y axis corresponded to the north-south line. The following table illustrates the coordinates, and the sample codes used during each phase.

Coordinates (feet)	Sample Codes Pre	 Mid	 Post
2, 0	PB1	PB1	PB8
6, 0	PB2	PB2	PB9
10, 0	PB3	PB3	PB10
- 2, 0	PB5	PB7	PB4
- 6, 0	PB6	PB8	PB5
-10, 0	PB7	PB9	PB6
0, 2	PB10	PB10	PB11
0, 6	PB11	PB11	PB12
0, 10	PB12	PB12	PB13
0,- 2	PB4	PB4	PB1
0,- 6	PB8	PB5	PB3
0,-10	PB9	PB6	PB7

PRETREATMENT

PUNCH BAR SAMPLES (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
PB-01	12/11/87	ECD	0	3	0	153	55	X 1
PB-02	12/11/87	ECD	0	3	0	2	66	X 1
PB-03	12/11/87	ECD	0	3	1347	2	2	X 1
PB-04	12/14/87	ECD	0	3	2	2	2	X 1
PB-04	12/14/87	ECD	0	3	21922	2	12803	X 100
PB-04	12/14/87	ECD	0	3	23442	2	1	X 200
PB-05	12/14/87	ECD	0	3	12037	2	4415	X 200
PB-07	12/14/87	ECD	0	3	1	2	0	X 2000
PB-BL-1	12/14/87	ECD	0	3	0	9	0	X 1
PB-BL-2	12/14/87	ECD	0	3	0	163	0	X 1
PB-03	12/15/87	ECD	1	3	27	2	73	X 1
PB-06	12/15/87	ECD	1724374	3	63821	2	2	X 200
PB-07	12/15/87	ECD	0	3	19811	2	2	X 1
PB-09	12/15/87	ECD	1	3	16453	2	2	X 1
PB-09	12/15/87	FID	0	97539	1	561195	0	X 1
PB-10	12/15/87	FID	0	1604896	0	0	0	X 1
PB-11	12/15/87	ECD	0	3	38	2	1	X 1
PB-11	12/15/87	FID	0	2616488	0	0	0	X 1
PB-12	12/15/87	FID	0	917281	1	3973080	407025	X 1
PB-05	12/16/87	FID	0	332970	0	292262	0	X 1
PB-06	12/16/87	FID	0	1348251	1	1419513	0	X 1
PB-07	12/16/87	FID	0	207530	1	1016113	0	X 1
PB-08	12/16/87	ECD	0	3	39496	2	1	X 100
PB-10	12/16/87	ECD	0	3	1	7065	0	X 100
PB-11	12/18/87	ECD	0	3	6216	2	0	X 200
PB-12	12/18/87	ECD	0	3	29996	2	7700	X 100
PB-08	12/15/88	FID	0	173172	1	1505377	0	X 1

0 = Below Detection Limit
1 = Below Quantitation Limit (Trace)
2 = Above Quantitation Limit
3 = Not quantified due to matrix interference

PRETREATMENT

VACUUM MONITORING WELLS (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
VMWG1D-1	12/15/87	FID	0	1	0	312999	0	X 1
VMWG1S-1	12/15/87	FID	0	1986059	97533	3709979	0	X 1
VMWG2D-1	12/15/87	FID	0	305069	154992	5192027	0	X 1
VMWG2S-1	12/15/87	FID	0	557102	429027	23412722	0	X 1
VMWG3D-1	12/15/87	FID	0	659022	1378130	28046470	1	X 1
VMWG3S-1	12/15/87	FID	0	2053161	387185	17162136	1	X 1
VMWG4D-1	12/15/87	FID	0	214447	0	1083832	0	X 1
VMWG4S-1	12/15/87	FID	0	1	1	540782	0	X 1
VMWG1D-1	12/18/87	ECD	1	3	20299	2	4815	X 100
VMWG1S-1	12/18/87	ECD	0	3	63259	2	7479	X 200
VMWG2D-1	12/18/87	ECD	0	3	116722	2	10463	X 200
VMWG2D-1	12/18/87	ECD	0	3	106115	2	5677	X 200
VMWG2S-1	12/18/87	ECD	0	3	237594	2	5460	X 200
VMWG3D-1	12/18/87	ECD	0	3	1321190	2	20450	X 200
VMWG3S-1	12/18/87	ECD	0	3	373302	2	13217	X 200
VMWG4D-1	12/18/87	ECD	0	3	7451	2	6127	X 200
VMWG4S-1	12/18/87	ECD	0	3	16551	2	1	X 200

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MID TREATMENT

PUNCH BAR SHALLOW SOIL GAS (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilutin
PB1/1	3/16/88	ECD	0	3	1723	2	426	X 1
PB1/1	3/16/88	ECD	0	3	2008	2	788	X 10
PB1/1	3/16/88	ECD	0	3	1	2	1	X 100
PB1/1	3/16/88	FID	0	359348	0	1	0	X 1
PB2/1	3/16/88	ECD	0	3	24	2	696	X 1
PB2/1	3/16/88	FID	0	0	0	1	0	X 1
PB3/1	3/16/88	ECD	0	3	0	2	1	X 100
PB3/1	3/16/88	FID	0	1	0	0	0	X 1
PB4/1	3/16/88	ECD	0	3	0	2	3731	X 100
PB4/1	3/16/88	FID	0	0	0	0	0	X 1
PB5/1	3/16/88	ECD	0	3	0	2	1	X 100
PB5/1	3/16/88	FID	0	0	0	0	0	X 1
PB6/1	3/16/88	ECD	0	3	0	6899	1	X 100
PB6/1	3/16/88	FID	0	0	0	1	0	X 1
PB7/1	3/16/88	ECD	0	3	0	2	1	X 100
PB7/1	3/16/88	FID	0	1	0	0	0	X 1
PB8/1	3/16/88	ECD	0	3	0	2	1	X 200
PB8/1	3/16/88	FID	0	0	0	156778	0	X 1
PB9/1	3/16/88	ECD	0	3	0	2	1	X 100
PB9/1	3/16/88	FID	0	0	0	1	0	X 1
PB10/1	3/17/88	ECD	0	3	1068	2	3349	X 5
PB10/1	3/17/88	FID	0	183092	C	306461	0	X 1
PB11/1	3/17/88	ECD	0	3	2589	2	4688	X 10
PB11/1	3/17/88	FID	0	531699	0	514260	0	X 1
PB12/1	3/17/88	ECD	0	3	1	2	406	X 1
PB12/1	3/17/88	FID	0	0	0	1	0	X 1

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MIDTREATMENT

VACUUM MONITORING WELLS (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
VMWG2D/1	3/14/88	ECD	0	3	7297	2	3459	X 10
VMWG2D/1	3/14/88	FID	0	54439	0	618666	0	X 1
VMWG2S/1	3/14/88	ECD	0	3	4322	2	2845	X 10
VMWG2S/1	3/14/88	FID	0	1	0	451413	0	X 1
VMWG3D/1	3/14/88	ECD	0	3	430721	2	46359	X 200
VMWG3D/1	3/14/88	FID	0	695993	459716	16298184	1	X 1
VMWG3S/1	3/14/88	ECD	0	3	29166	2	23810	X 100
VMWG3S/1	3/14/88	FID	0	303444	1	3851542	0	X 1
VMWG1D/1	3/15/88	ECD	0	3	286	2	91	X 1
VMWG1D/1	3/15/88	FID	0	0	0	70168	0	X 1
VMWG1S/1	3/15/88	ECD	0	3	172	2	661	X 1
VMWG1S/1	3/15/88	FID	0	0	0	37167	0	X 1
VMWG4D/1	3/15/88	ECD	0	3	200	2	344	X 1
VMWG4D/1	3/15/88	FID	0	0	0	0	0	X 1
VMWG4S/1	3/15/88	ECD	0	3	179	2	652	X 1
VMWG4S/1	3/15/88	FID	0	0	0	38857	0	X 1

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POST TREATMENT

PUNCH BAR SHALLOW SOIL GAS (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
PB1/1	4/19/88	ECD	1	3	27	2	1	X 1
PB1/1	4/19/88	FID	0	0	0	35211	0	X 1
PB2/1	4/19/88	ECD	0	3	68	2	1	X 1
PB2/1	4/19/88	FID	0	0	0	35358	0	X 1
PB10/1	4/20/88	ECD	0	3	1	2	22	X 1
PB10/1	4/20/88	FID	0	0	0	0	0	X 1
PB3/1	4/20/88	ECD	0	3	46	2	1	X 1
PB3/1	4/20/88	FID	0	0	0	0	0	X 1
PB4/1	4/20/88	ECD	0	3	52	2	1	X 1
PB4/1	4/20/88	FID	0	1	0	0	0	X 1
PB5/1	4/20/88	ECD	0	3	1533	10	0	X 1
PB5/1	4/20/88	FID	0	0	0	0	0	X 1
PB6/1	4/20/88	ECD	0	3	121	2	1	X 1
PB6/1	4/20/88	FID	0	0	0	0	0	X 1
PB7/1	4/20/88	ECD	0	3	171	2	19	X 1
PB7/1	4/20/88	FID	0	0	0	0	0	X 1
PB8/1	4/20/88	ECD	0	3	119	2	162	X 1
PB8/1	4/20/88	FID	0	1	0	0	0	X 1
PB9/1	4/20/88	ECD	0	3	76	2	1	X 1
PB9/1	4/20/88	FID	0	0	0	0	0	X 1
PB11/1	4/22/88	ECD	0	3	3432	2	157	X 1
PB11/1	4/22/88	FID	0	1	0	0	0	X 1
PB12/1	4/22/88	ECD	0	3	32	2	1	X 1
PB12/1	4/22/88	FID	0	0	0	0	0	X 1
PB13/1	4/22/88	ECD	0	3	21	2	50	X 1
PB13/1	4/22/88	FID	0	0	0	0	0	X 1

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3 = Not quantified due to matrix interference

POST TREATMENT

VACUUM MONITORING WELLS (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
VMWG1D/1	4/21/88	ECD	0	3	6399	2	1	X 1
VMWG1D/1	4/21/88	FID	0	0	0	0	0	X 1
VMWG1S/1	4/21/88	ECD	1	3	102	2	219	X 1
VMWG1S/1	4/21/88	FID	0	0	0	0	0	X 1
VMWG2D/1	4/21/88	ECD	1	3	4620	2	1074	X 10
VMWG2D/1	4/21/88	FID	0	1	0	350233	0	X 1
VMWG2S/1	4/21/88	ECD	56536	3	3840	2	189	X 10
VMWG2S/1	4/21/88	FID	0	1	0	318016	0	X 1
VMWG3D/1	4/21/88	ECD	0	3	596128	2	29026	X 200
VMWG3D/1	4/21/88	FID	0	911813	566737	17670335	1	X 1
VMWG3S/1	4/21/88	ECD	0	3	22827	2	6732	X 25
VMWG3S/1	4/21/88	FID	0	170198	1	1483036	0	X 1
VMWG4D/1	4/22/88	ECD	0	3	4725	2	208	X 1
VMWG4D/1	4/22/88	FID	0	0	0	0	0	X 1
VMWG4S/1	4/22/88	ECD	0	3	275	2	588	X 1
VMWG4S/1	4/22/88	ECD	0	3	431	2	1115	X 20
VMWG4S/1	4/22/88	FID	0	0	0	1	0	X 1

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APPENDIX E

PROCESS AND SOIL GAS

PROCESS AND SOIL GAS

The FID was generally used to quantify the DCE and TCE values and the ECD was used to quantify the TRI and PCE values. MeCl was usually not detected on either detector. The following codes indicate the reason a quantifiable value is not reported for a given sample:

- 0 - Below Detection Limit
- 1 - Below Quantitation Limit (Trace)
- 2 - Above Quantitation Limit
- 3 - Not quantified due to matrix interference

For the majority of analyses TCD values from the ECD are reported as "2" because the concentrations present exceeded the linear range of the detector. Also there were problems with additional unidentified compounds eluting at the same time as TDE on the ECD. Consequently, all DCE values on the ECD are reported as "3".

Typical detection limits and quantitation limits for each of the compounds on the FID (in ug/cubic meter) are as follows:

	MC	DCE	TRI	TCE	PCE
Detection Limit -	<30,000	<6,500	<20,000	<15,000	<30,000
Quant. Limit -	<100,000	<45,000	<100,000	<30,000	<100,000

Determination of detection limits and upper and lower quantitation limits are more complicated for the ECD. Because of the high TCE concentrations, most of the samples injected on the ECD had to be diluted and this dilution factor has to be applied when determining detection and quantitation limits. The last column on each of the attached tables shows the dilution factor used to calculate all reported component concentrations. To determine the actual detection and quantitation limits for each run, multiply the value given below by the dilution factor (all values in ug/cubic meter).

	MC	DCE	TRI	TCE	PCE
Detection Limit -	<1,000	<1,300	<8	<8	<45
Quant. Limit -	<3,000	<4,000	<22	>160[a]	<55

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[a] - Upper Quantitation Limit

These values are averages because they all change slightly when a new calibration curve is generated. In addition these are based on standard temperature and pressure whereas the values reported in the tables are corrected to process conditions.

The attached data tables are broken down by source, test phase, and date. The following test phases were used:

Commissioning - 12/16/87 - 12/18/87 and 1/7/88
Aborted Active Treatment - 1/8/88 - 1/15/88
Active Treatment - 2/11/88 - 4/18/88

The dates listed in these tables are the dates the samples were analyzed on the GC. In most cases this is also the date the sample was collected, however, early in the program some samples were analyzed a day or two after collection for various reasons.

COMMISSIONING AND ABORTED ACTIVE TREATMENT

BACKGROUND PROCESS GAS AND AMBIENT BLANKS (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
BKG 1 CARB	12/16/87	ECD	0	3	0	2	1	X 1
BKG 2 CARB	12/16/87	ECD	0	3	0	2	0	X 1
BKG SEP IN	12/16/87	ECD	0	3	2	0	2	X 1
BKG SEP IN	12/16/87	ECD	0	3	39980	2	1	X 333
BKG SEP OUT	12/16/87	ECD	0	3	206	2	39	X 1
BKG SEP OUT	12/16/87	ECD	0	3	0	9507	0	X 100
BKG VAC OUT	12/16/87	ECD	1	3	1	157	53	X 1
GTV-BL	1/07/88	ECD	0	3	0	2	1	X 1
GTVFBB-1	1/13/88	ECD	0	3	101	2	308	X 1
GTVFBB-1	1/13/88	FID	0	0	0	33620	0	X 1
GTV FBB-1	1/14/88	ECD	1	3	78	2	292	X 1
GTVFBB-1	1/14/88	FID	0	0	0	0	0	X 1

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1 = Below Quantitation Limit (Trace)
2 = Above Quantitation Limit
3 = Not quantified due to matrix interference

COMMISSIONING

EXTRACTION WELLS (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
EWG4S-1	12/16/87	FID	0	584852	1	9128599	0	X 1
EWG4S-2	12/16/87	FID	0	143657	1	2032381	0	X 1
EWG4S-3	12/16/87	FID	0	249063	1	4061706	0	X 1
EWG4S-5	12/16/87	FID	0	37566	0	568417	0	X 1
EWG4S-6	12/16/87	FID	0	1064421	120113	19474554	1	X 1
EWG4S-7	12/16/87	FID	0	1070386	122174	18774964	71770	X 1
EWG4S-8	12/16/87	FID	0	1071515	132475	18287653	1	X 1
EWG4S-9	12/16/87	FID	0	1155353	130621	18925394	1	X 1
EWG2S-1	12/17/87	FID	0	374189	1	3380349	0	X 1
EWG2S-2	12/17/87	FID	0	298232	1	2448486	0	X 1
EWG2S-3	12/17/87	FID	0	379138	1	3448380	0	X 1
EWG2S-4	12/17/87	FID	0	369240	1	3458660	0	X 1
EWG2S-5	12/17/87	FID	0	328572	1	3202866	0	X 1
EWG2S-6	12/17/87	FID	0	255413	1	2388014	0	X 1
EWG2S-7	12/17/87	FID	0	168697	1	1674452	0	X 1
EWG3S-1	12/17/87	ECD	0	3	339438	2	31487	X 100
EWG3S-1	12/17/87	FID	0	933859	296687	20873507	0	X 1
EWG3S-2	12/17/87	ECD	0	3	313147	2	130678	X 500
EWG3S-2	12/17/87	FID	0	718667	236830	16700011	89725	X 1
EWG3S-3	12/17/87	ECD	0	3	389892	2	37993	X 500
EWG3S-3	12/17/87	FID	0	720799	227326	17041155	91405	X 1
EWG3S-4	12/17/87	FID	0	563182	186573	14352328	95061	X 1
EWG3S-5	12/17/87	FID	0	646322	192226	15430708	1	X 1
EWG3S-6	12/17/87	FID	0	631575	201178	15403768	1	X 1
EWG3S-7	12/17/87	FID	0	537189	188693	13524698	93436	X 1
EWG3S-8	12/17/87	FID	0	292928	121555	7383654	1	X 1
EWG3S-1	12/18/87	ECD	0	3	227639	2	14655	X 200
EWG3S-2	12/18/87	ECD	0	3	222715	2	10743	X 200
EWG3S-3	12/18/87	ECD	0	3	94567	2	9822	X 200
EWG4D-1	12/18/87	FID	0	319965	200724	7933541	1	X 1
EWG4D-2	12/18/87	FID	0	294359	168003	6362797	1	X 1
EWG4D-3	12/18/87	FID	0	273702	145181	5294571	0	X 1
EWG4D-4	12/18/87	FID	0	277134	125900	5334763	1	X 1
EWG4D-5	12/18/87	FID	0	252167	103076	4245304	0	X 1
EWG4D-6	12/18/87	FID	0	230657	91296	3686675	0	X 1
EWG4D-7	12/18/87	FID	0	218942	1	3244091	0	X 1
EWG4S-6	12/18/87	ECD	0	3	149969	2	43047	X 200
EWG4S-7	12/18/87	ECD	0	3	163454	2	39863	X 200
EWG4S-8	12/18/87	ECD	0	3	140871	2	32797	X 200
EWG4S-9	12/18/87	ECD	0	3	155352	2	33624	X 200
EWG2S-1	12/19/87	ECD	0	3	35261	2	1	X 200
EWG2S-2	12/19/87	ECD	0	3	18020	2	0	X 200
EWG2S-3	12/19/87	ECD	0	3	32623	2	1	X 200
EWG2S-4	12/19/87	ECD	0	3	27198	2	1	X 200
EWG2S-5	12/19/87	ECD	0	3	27907	2	1	X 200
EWG2S-6	12/19/87	ECD	0	3	17914	2	0	X 200

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
EWG2S-7	12/19/87	ECD	0	3	4304	2	0	X 200
EWG3S-4	12/19/87	ECD	6855360	3	97369	2	5182	X 200
EWG3S-5	12/19/87	ECD	0	3	195092	2	11132	X 200
EWG3S-6	12/19/87	ECD	0	3	181290	2	13726	X 200
EWG3S-7	12/19/87	ECD	0	3	203954	2	10890	X 200
EWG3S-8	12/19/87	ECD	0	3	127552	2	5152	X 200
EWG4D-1	12/19/87	ECD	0	3	179585	2	11272	X 200
EWG4D-2	12/19/87	ECD	0	3	288168	2	24056	X 200
EWG4D-3	12/19/87	ECD	0	3	103572	2	0	X 200
EWG4D-4	12/19/87	ECD	0	3	109111	2	9290	X 200
EWG4D-5	12/19/87	ECD	0	3	90495	2	10831	X 200
EWG4D-6	12/19/87	ECD	0	3	86339	2	9615	X 200
EWG4D-7	12/19/87	ECD	0	3	67438	2	10183	X 200
EWG2D-2	1/07/88	ECD	1	3	62431	2	13558	X 100
EWG2D-2	1/07/88	FID	0	154728	1	3447982	0	X 1
EWG2D-3	1/07/88	ECD	0	3	61070	2	14132	X 100
EWG2D-3	1/07/88	FID	0	154166	1	3590118	0	X 1
EWG2D-4	1/07/88	ECD	1581222	3	230691	2	2	X 100
EWG2D-4	1/07/88	FID	0	126059	1	2913590	1	X 1
EWG2D-5	1/07/88	ECD	0	3	55553	2	28539	X 100
EWG2D-5	1/07/88	FID	0	137302	1	3309597	0	X 1
EWG2D-6	1/07/88	ECD	0	3	39248	2	12143	X 100
EWG2D-6	1/07/88	FID	0	123249	1	2837784	0	X 1
EWG2D-7	1/07/88	ECD	0	3	40800	2	20876	X 100
EWG2D-7	1/07/88	FID	0	128448	1	3177726	0	X 1
EWG3D-1	1/07/88	ECD	0	3	0	0	0	X 1
EWG3D-1	1/07/88	FID	0	0	0	0	0	X 1
EWG3D-2	1/07/88	ECD	0	3	52092	2	31438	X 100
EWG3D-2	1/07/88	FID	0	178463	1	2641980	0	X 1
EWG3D-3	1/07/88	ECD	0	3	42403	2	14763	X 100
EWG3D-3	1/07/88	FID	0	161976	1	2492641	0	X 1
EWG3D-4	1/07/88	ECD	0	3	20727	2	5447	X 100
EWG3D-4	1/07/88	FID	0	67402	1	1099667	0	X 1
EWG3D-5	1/07/88	ECD	1	3	62855	2	17961	X 100
EWG3D-5	1/07/88	FID	0	149973	1	2629196	0	X 1
EWG3D-6	1/07/88	ECD	0	3	61471	2	15459	X 100
EWG3D-6	1/07/88	FID	0	161844	1	2856726	0	X 1
EWG3D-7	1/07/88	ECD	0	3	63597	2	19726	X 100
EWG3D-7	1/07/88	FID	0	162767	1	3217661	0	X 1
EWG1S-1	1/08/88	ECD	0	3	185736	2	52824	X 200
EWG1S-1	1/08/88	FID	0	1068552	170610	13904589	1	X 1
EWG1S-2	1/08/88	ECD	0	3	197203	2	44499	X 200
EWG1S-2	1/08/88	FID	0	929482	157298	12316003	1	X 1
EWG1S-3	1/08/88	ECD	0	3	168188	2	40643	X 200
EWG1S-3	1/08/88	FID	0	897747	150736	11910436	1	X 1
EWG1S-4	1/08/88	ECD	0	3	159061	2	38967	X 200
EWG1S-4	1/08/88	FID	0	810582	131426	10885522	1	X 1
EWG1S-5	1/08/88	ECD	0	3	223338	2	61458	X 200
EWG1S-5	1/08/88	FID	0	793092	125426	10715529	1	X 1
EWG1S-6	1/08/88	ECD	0	3	144778	2	36699	X 200

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	1,1,1-Tri	Trichloro ethylene	Tetrachloro ethylene	Dilution
EWG1S-6	1/08/88	FID	0	826943	119989	10204954	1	X 1
EWG1S-7	1/08/88	ECD	0	3	89438	2	28931	X 200
EWG1S-7	1/08/88	FID	0	548803	77993	7453359	1	X 1

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ABORTED ACTIVE TREATMENT

EXTRACTION WELLS (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
EWG2S-1	1/08/88	ECD	1	3	22795	2	91540	X 200
EWG2S-1	1/08/88	FID	0	125658	1	2155229	0	X 1
EWG3S-1	1/08/88	ECD	0	3	389351	2	70927	X 200
EWG3S-1	1/08/88	FID	0	414087	156162	13472502	0	X 1
EWG4S-1	1/08/88	ECD	0	3	95722	2	75301	X 200
EWG4S-1	1/08/88	FID	0	802466	81939	14733899	1	X 1
EWG1S-1	1/09/88	ECD	632112	3	46041	2	6333	X 100
EWG1S-1	1/09/88	FID	0	681416	89531	7966045	0	X 1
EWG1S-2	1/09/88	ECD	8532	3	405	2	65	X 1
EWG2S-1	1/09/88	ECD	0	3	13103	2	4896	X 100
EWG2S-1	1/09/88	FID	0	119625	1	2100488	0	X 1
EWG3S-1	1/09/88	ECD	0	3	157986	2	28806	X 200
EWG3S-1	1/09/88	FID	0	317865	111731	11195156	1	X 1
EWG4S-1	1/09/88	ECD	0	3	0	0	0	X 1
EWG4S-1	1/09/88	FID	0	731363	1	13931156	1	X 1
EWG1D-1	1/11/88	ECD	0	3	16169	2	9584	X 200
EWG1D-1	1/11/88	FID	0	66564	1	1200891	0	X 1
EWG1D-2	1/11/88	ECD	0	3	21056	2	7420	X 50
EWG1D-2	1/11/88	FID	0	79529	1	1386344	0	X 1
EWG1S-1	1/11/88	ECD	0	3	28884	2	8105	X 100
EWG1S-1	1/11/88	FID	0	439012	1	4676146	0	X 1
EWG1S-2	1/11/88	ECD	0	3	60257	2	2	X 22
EWG1S-2	1/11/88	FID	0	51132	0	441879	0	X 1
EWG2D-1	1/11/88	ECD	0	3	24240	2	11534	X 200
EWG2D-1	1/11/88	FID	0	101348	1	2638095	0	X 1
EWG2S-1	1/11/88	ECD	0	3	5289	2	2664	X 100
EWG2S-1	1/11/88	FID	0	101535	0	1959903	0	X 1
EWG3D-1	1/11/88	ECD	0	3	109142	2	22344	X 200
EWG3D-1	1/11/88	FID	0	172181	1	2892843	0	X 1
EWG3S-1	1/11/88	ECD	0	3	82761	2	16047	X 100
EWG3S-1	1/11/88	FID	0	417983	138997	14509164	1	X 1
EWG4D-1	1/11/88	ECD	0	3	114881	2	92191	X 200
EWG4D-1	1/11/88	FID	0	350063	1	2768164	1	X 1
EWG4S-1	1/11/88	ECD	0	3	51222	2	37625	X 100
EWG4S-1	1/11/88	FID	0	864197	85581	15819019	1	X 1
EWG1D-1	1/12/88	ECD	0	3	19396	2	5900	X 100
EWG1D-1	1/12/88	FID	0	71952	0	1255746	0	X 1
EWG1D-2	1/12/88	ECD	0	3	10704	2	4026	X 100
EWG1D-2	1/12/88	FID	0	82548	0	1107580	0	X 1
EWG1S-1	1/12/88	ECD	0	3	57524	2	23990	X 100
EWG1S-1	1/12/88	FID	0	316705	1	3599533	0	X 1
EWG1S-2	1/12/88	ECD	0	3	34310	2	21322	X 100
EWG1S-2	1/12/88	FID	0	247255	1	3108099	0	X 1
EWG2D-1	1/12/88	ECD	0	3	16551	2	19808	X 100
EWG2D-1	1/12/88	FID	0	58511	0	1864182	0	X 1
EWG2S-1	1/12/88	ECD	0	3	7684	2	4596	X 100

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
EWG2S-1	1/12/88	FID	0	80727	0	1459984	0	X 1
EWG3D-1	1/12/88	ECD	0	3	59497	2	28025	X 100
EWG3D-1	1/12/88	FID	0	215186	1	4321841	1	X 1
EWG3S-1	1/12/88	ECD	0	3	126695	2	28650	X 100
EWG3S-1	1/12/88	FID	0	287167	99595	9944055	0	X 1
EWG4D-1	1/12/88	ECD	0	3	54823	2	40394	X 100
EWG4D-1	1/12/88	FID	0	409449	1	2819506	1	X 1
EWG4S-1	1/12/88	ECD	0	3	89124	2	54247	X 100
EWG4S-1	1/12/88	FID	0	698826	1	12451422	1	X 1
EWG1D-1	1/13/88	ECD	0	3	6103	2	3650	X 100
EWG1D-1	1/13/88	FID	0	82982	0	944719	0	X 1
EWG1D-2	1/13/88	ECD	1	3	3563	2	1	X 50
EWG1D-2	1/13/88	FID	0	55689	0	337067	0	X 1
EWG1S-1	1/13/88	ECD	0	3	19375	2	10394	X 100
EWG1S-1	1/13/88	FID	0	179025	1	2824665	0	X 1
EWG1S-2	1/13/88	ECD	0	3	14378	2	4742	X 50
EWG1S-2	1/13/88	FID	0	104348	1	1804250	0	X 1
EWG2D-1	1/13/88	ECD	0	3	6536	2	7676	X 50
EWG2D-1	1/13/88	FID	0	92132	0	1548603	0	X 1
EWG2S-1	1/13/88	ECD	0	3	5925	2	3742	X 50
EWG2S-1	1/13/88	FID	0	67416	0	1362695	0	X 1
EWG3D-1	1/13/88	ECD	0	3	46068	2	18924	X 100
EWG3D-1	1/13/88	FID	0	213408	1	4314039	1	X 1
EWG3S-1	1/13/88	ECD	0	3	75246	2	19337	X [illegible]
EWG3S-1	1/13/88	FID	0	227759	1	7691369	0	X 1
EWG4D-1	1/13/88	ECD	0	3	59711	2	29467	X 100
EWG4D-1	1/13/88	FID	0	452141	1	2455205	1	X 1
EWG4S-1	1/13/88	ECD	0	3	79588	2	43797	X 200
EWG4S-1	1/13/88	FID	1	704779	1	11747508	1	X 1
EWG1D-1	1/15/88	ECD	0	3	0	2	1	X 100
EWG1D-1	1/15/88	FID	0	49678	0	415590	0	X 1
EWG1D-2	1/15/88	ECD	0	3	952	2	0	X 50
EWG1D-2	1/15/88	FID	0	1	0	136456	0	X 1
EWG1S-1	1/15/88	ECD	0	3	25518	2	12027	X 100
EWG1S-1	1/15/88	FID	0	244689	1	2803991	0	X 1
EWG1S-2	1/15/88	ECD	0	3	23593	2	9363	X 100
EWG1S-2	1/15/88	FID	0	211592	1	2472789	0	X 1
EWG2D-1	1/15/88	ECD	0	3	1	2	1	X 100
EWG2D-1	1/15/88	FID	0	65947	0	998452	0	X 1
EWG2S-1	1/15/88	ECD	0	3	1	2	1	X 100
EWG2S-1	1/15/88	FID	0	1	0	282044	0	X 1
EWG3D-1	1/15/88	ECD	1	3	30687	2	13257	X 100
EWG3D-1	1/15/88	FID	0	194440	1	2771117	1	X 1
EWG3S-1	1/15/88	ECD	0	3	77763	2	27548	X 100
EWG3S-1	1/15/88	FID	0	262787	1	9204313	0	X 1
EWG4D-1	1/15/88	ECD	1	3	240095	2	2	X 100
EWG4D-1	1/15/88	FID	0	401536	1	2505056	1	X 1
EWG4S-1	1/15/88	ECD	0	3	69851	2	48000	X 100
EWG4S-1	1/15/88	FID	0	613278	1	11591671	1	X 1

ABORTED ACTIVE TREATMENT

VACUUM MONITORING WELLS (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
VMWG1S-1	1/08/88	ECD	0	3	28491	2	17989	X 200
VMWG1S-1	1/08/88	FID	0	1056707	1	2401558	0	X 1
VMWG2S-1	1/08/88	FID	0	162544	1	8047600	0	X 1
VMWG3S-1	1/08/88	FID	0	2580038	289073	18738147	1	X 1
VMWG4S-1	1/08/88	FID	0	1	0	86349	0	X 1
VMWG1S-1	1/09/88	ECD	0	3	22462	2	12941	X 50
VMWG1S-1	1/09/88	FID	0	723182	1	1574110	0	X 1
VMWG1S-2	1/09/88	FID	0	729897	1	7917714	0	X 1
VMWG2S-1	1/09/88	ECD	552257	3	17831	2	29174	X 100
VMWG2S-1	1/09/88	FID	0	129484	1	5959752	0	X 1
VMWG3S-1	1/09/88	ECD	0	3	146559	2	12392	X 100
VMWG3S-1	1/09/88	FID	0	2632382	232769	19664037	1	X 1
VMWG4S-1	1/09/88	ECD	0	3	0	2	0	X 200
VMWG1D-1	1/11/88	ECD	0	3	3132	2	1039	X 25
VMWG1D-1	1/11/88	FID	0	1	0	167860	0	X 1
VMWG1S-1	1/11/88	ECD	0	3	24966	2	11394	X 50
VMWG1S-1	1/11/88	FID	0	533433	0	1283137	0	X 1
VMWG2D-1	1/11/88	ECD	0	3	172469	2	36969	X 200
VMWG2D-1	1/11/88	FID	0	222465	1	3975184	0	X 1
VMWG2S-1	1/11/88	ECD	0	3	58569	2	29597	X 200
VMWG2S-1	1/11/88	FID	0	96424	1	5209704	0	X 1
VMWG3D-1	1/11/88	ECD	0	3	40945	2	7258	X 100
VMWG3D-1	1/11/88	FID	0	473168	0	5303067	0	X 1
VMWG3S-1	1/11/88	ECD	1	3	145348	2	18977	X 100
VMWG3S-1	1/11/88	FID	0	2505825	220410	16751402	1	X 1
VMWG4D-1	1/11/88	ECD	0	3	6661	2	2454	X 50
VMWG4D-1	1/11/88	FID	0	1	0	252757	0	X 1
VMWG4S-1	1/11/88	ECD	0	3	449	2	689	X 1
VMWG4S-1	1/11/88	FID	0	1	0	43295	0	X 1
VMWG1D-1	1/12/88	ECD	0	3	1286	2	1	X 50
VMWG1D-1	1/12/88	FID	0	1	0	146289	0	X 1
VMWG1S-1	1/12/88	ECD	0	3	3908	2	8425	X 100
VMWG1S-1	1/12/88	FID	0	312016	0	817861	0	X 1
VMWG2D-1	1/12/88	ECD	0	3	47350	2	12303	X 100
VMWG2D-1	1/12/88	FID	0	274611	1	4744451	0	X 1
VMWG2S-1	1/12/88	ECD	0	3	17240	2	15914	X 100
VMWG2S-1	1/12/88	FID	0	52781	0	2057866	0	X 1
VMWG3D-1	1/12/88	ECD	0	3	46538	2	6236	X 100
VMWG3D-1	1/12/88	FID	0	149726	1	2561259	0	X 1
VMWG3S-1	1/12/88	ECD	0	3	203441	2	57490	X 200
VMWG3S-1	1/12/88	FID	0	1824002	165096	18160731	1	X 1
VMWG4D-1	1/12/88	ECD	1	3	5318	2	34217	X 50
VMWG4D-1	1/12/88	FID	0	1	0	226630	0	X 1
VMWG4S-1	1/12/88	ECD	0	3	1	2	1	X 50

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
VMWG4S-1	1/12/88	FID	0	0	0	96140	1	X 1
VMWG1D-1	1/13/88	ECD	0	3	1165	2	2	X 1
VMWG1D-1	1/13/88	FID	0	1	0	94148	1	X 1
VMWG1S-1	1/13/88	ECD	1	3	9860	2	2	X 50
VMWG1S-1	1/13/88	FID	0	219633	0	721009	0	X 1
VMWG2D-1	1/13/88	ECD	0	3	62042	2	19685	X 100
VMWG2D-1	1/13/88	FID	0	341975	1	5183408	0	X 1
VMWG2S-1	1/13/88	ECD	436370	3	14995	2	11047	X 100
VMWG2S-1	1/13/88	FID	1	63173	0	1777911	0	X 1
VMWG3D-1	1/13/88	ECD	0	3	37467	2	6637	X 100
VMWG3D-1	1/13/88	FID	0	118975	1	2228188	0	X 1
VMWG3S-1	1/13/88	ECD	0	3	10511	2	1	X 200
VMWG3S-1	1/13/88	FID	0	1645891	121482	15708378	1	X 1
VMWG4D-1	1/13/88	ECD	0	3	1188	2	683	X 1
VMWG4D-1	1/13/88	FID	0	1	0	123468	0	X 1
VMWG4S-1	1/13/88	ECD	330573	3	1852	2	1	X 50
VMWG4S-1	1/13/88	FID	0	1	0	296281	0	X 1
VMWG1D-1	1/15/88	ECD	0	3	983	2	662	X 1
VMWG1D-1	1/15/88	FID	0	0	0	96557	0	X 1
VMWG1S-1	1/15/88	ECD	0	3	2119	2	11497	X 100
VMWG1S-1	1/15/88	FID	0	128451	0	411668	0	X 1
VMWG2D-1	1/15/88	ECD	0	3	36977	2	9271	X 100
VMWG2D-1	1/15/88	FID	0	328753	1	2955170	0	X 1
VMWG2S-1	1/15/88	ECD	0	3	12782	2	4139	X 100
VMWG2S-1	1/15/88	FID	0	77139	0	1558630	0	X 1
VMWG3D-1	1/15/88	ECD	0	3	33478	2	3406	X 100
VMWG3D-1	1/15/88	FID	0	66791	1	1363507	0	X 1
VMWG3S-1	1/15/88	ECD	0	3	38855	2	13365	X 100
VMWG3S-1	1/15/88	FID	1	1141963	1	7550444	1	X 1
VMWG4D-1	1/15/88	ECD	0	3	1	2	1	X 50
VMWG4D-1	1/15/88	FID	0	1	0	121914	0	X 1
VMWG4S-1	1/15/88	ECD	0	3	0	2	1	X 50
VMWG4S-1	1/15/88	FID	0	1	0	141657	0	X 1

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ABORTED ACTIVE TREATMENT

PROCESS GAS (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
PGCARBOUT	1/08/88	ECD	0	3	1	2	324	X 1
PGSECOND	1/08/88	ECD	0	3	48	2	169	X 1
PGSEPIN	1/08/88	ECD	0	3	77172	2	26004	X 200
PGSEPIN-1	1/08/88	FID	0	367442	1	7700034	1	X 1
PGCARBOUT-1	1/09/88	FID	0	0	0	156524	0	X 1
PGSEPIN-1	1/09/88	FID	0	291053	1	5028567	0	X 1
PGCARBOUT-1	1/11/88	ECD	0	3	1	2	27	X 1
PGCARBOUT-1	1/11/88	FID	0	0	0	59694	0	X 1
PGSECOND-1	1/11/88	ECD	0	3	1	2	31	X 1
PGSECOND-1	1/11/88	FID	0	0	0	23367	0	X 1
PGSEPIN-1	1/11/88	ECD	303870	3	46011	2	2	X 100
PGSEPIN-1	1/11/88	FID	0	325280	1	6438232	1	X 1
PGCARBOUT	1/12/88	ECD	0	3	252	2	341	X 1
PGCARBOUT-1	1/12/88	FID	0	0	0	27037	0	X 1
PGCARBOUT	1/13/88	ECD	1	3	600	2	2	X 1
PGCARBOUT-1	1/13/88	FID	0	1	0	117787	0	X 1
PGSECOND	1/13/88	ECD	1	3	388	2	400	X 1
PGSECOND-1	1/13/88	FID	0	0	0	60605	0	X 1
PGSEPIN	1/13/88	ECD	0	3	23455	2	8811	X 100
PGSEPIN-1	1/13/88	FID	0	136885	1	2369626	0	X 1
PGCARBOUT	1/15/88	ECD	0	3	1	2	40	X 1
PGCARBOUT-1	1/15/88	FID	0	0	0	51524	0	X 1

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ACTIVE TREATMENT

EXTRACTION WELL #1 SHALLOW (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
EWG1S/1	2/11/88	ECD	0	3	15888	2	6988	X 200
EWG1S/1	2/11/88	FID	0	160095	1	2958447	0	X 1
EWG1S/2	2/11/88	ECD	0	3	7753	2	1	X 200
EWG1S/2	2/11/88	FID	0	84651	0	1396253	0	X 1
EWG1S/1	2/12/88	ECD	0	3	1	2	4671	X 200
EWG1S/1	2/12/88	FID	0	54421	0	1070815	0	X 1
EWG1S/2	2/12/88	ECD	0	3	4002	2	2524	X 100
EWG1S/2	2/12/88	FID	0	35747	0	727803	0	X 1
EWG1S/1	2/13/88	ECD	0	3	4312	2	3540	X 100
EWG1S/1	2/13/88	FID	0	42996	0	797145	0	X 1
EWG1S/2	2/13/88	ECD	0	3	1	2	1	X 200
EWG1S/2	2/13/88	FID	0	35633	0	739873	0	X 1
EWG1S/1	2/14/88	ECD	0	3	3215	2	2782	X 100
EWG1S/1	2/14/88	FID	0	1	0	717758	0	X 1
EWG1S/2	2/14/88	ECD	0	3	1	2	1	X 100
EWG1S/2	2/14/88	FID	0	1	0	585332	0	X 1
EWG1S/1	2/15/88	ECD	0	3	1	2	2187	X 100
EWG1S/1	2/15/88	FID	0	1	0	653833	0	X 1
EWG1S/2	2/15/88	ECD	0	3	1	2	1	X 200
EWG1S/2	2/15/88	FID	0	1	0	537555	0	X 1
EWG1S/1	2/16/88	ECD	0	3	1481	2	2308	X 100
EWG1S/1	2/16/88	FID	0	1	0	730565	0	X 1
EWG1S/2	2/16/88	ECD	0	3	1448	2	2317	X 50
EWG1S/2	2/16/88	FID	0	1	0	581507	0	X 1
EWG1S/1	2/17/88	ECD	0	3	1614	2	1757	X 30
EWG1S/1	2/17/88	FID	0	1	0	569543	0	X 1
EWG1S/2	2/17/88	ECD	0	3	1	2	1455	X 50
EWG1S/2	2/17/88	FID	0	1	0	507996	0	X 1
EWG1S/1	2/18/88	ECD	0	3	2665	2	2	X 1
EWG1S/1	2/18/88	ECD	0	3	864	2	1492	X 10
EWG1S/1	2/18/88	FID	0	1	0	507978	0	X 1
EWG1S/1	2/19/88	ECD	0	3	1452	2	2064	X 25
EWG1S/1	2/19/88	FID	0	1	0	499608	0	X 1
EWG1S/1	2/20/88	ECD	0	3	1655	2	2	X 1
EWG1S/1	2/20/88	FID	0	1	0	350299	0	X 1
EWG1S/1	2/21/88	ECD	0	3	755	2	588	X 25
EWG1S/1	2/21/88	FID	0	1	0	434579	0	X 1
EWG1S/1	2/22/88	ECD	0	3	519	2	1	X 25

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
EWG1S/1	2/22/88	FID	0	0	0	313707	0	X 1
EWG1S/1	2/23/88	ECD	0	3	1481	2	2	X 1
EWG1S/1	2/23/88	ECD	0	3	1378	2	2796	X 5
EWG1S/1	2/23/88	FID	0	1	0	334785	0	X 1
EWG1S/1	2/24/88	ECD	0	3	760	2	1167	X 25
EWG1S/1	2/24/88	FID	0	1	0	462777	0	X 1
EWG1S/1	2/25/88	ECD	0	3	0	2	0	X 100
EWG1S/1	2/25/88	FID	0	1	0	309017	0	X 1
EWG1S/1	2/26/88	ECD	0	3	751	2	2295	X 5
EWG1S/1	2/26/88	FID	0	1	0	277702	0	X 1
EWG1S/1	2/29/88	ECD	0	3	1782	2	5498	X 10
EWG1S/1	2/29/88	FID	0	1	0	350668	0	X 1
EWG1S/1	3/01/88	ECD	0	3	1413	2	4958	X 10
EWG1S/1	3/01/88	FID	0	1	0	260611	0	X 1
EWG1S/1	3/02/88	ECD	0	3	683	2	3187	X 25
EWG1S/1	3/02/88	FID	0	1	0	232811	0	X 1
EWG1S/1	3/03/88	ECD	0	3	338	2	792	X 10
EWG1S/1	3/03/88	FID	0	1	0	172275	0	X 1
EWG1S/1	3/04/88	ECD	0	3	1	2	727	X 20
EWG1S/1	3/04/88	FID	0	1	0	214465	0	X 1
EWG1S/1	3/05/88	ECD	0	3	332	2	756	X 10
EWG1S/1	3/05/88	FID	0	1	0	239042	0	X 1
EWG1S/1	3/06/88	ECD	21983	3	993	2	0	X 10
EWG1S/1	3/06/88	FID	0	1	0	219469	0	X 1
EWG1S/1	3/07/88	ECD	0	3	398	2	1959	X 10
EWG1S/1	3/07/88	FID	0	0	0	118072	0	X 1
EWG1S/1	3/08/88	ECD	0	3	388	2	1858	X 5
EWG1S/1	3/08/88	FID	0	0	0	136018	0	X 1
EWG1S/1	3/09/88	ECD	0	3	474	2	2633	X 10
EWG1S/1	3/09/88	FID	0	0	0	1528703	0	X 1
EWG1S/1	3/10/88	ECD	0	3	454	2	2	X 1
EWG1S/1	3/10/88	ECD	0	3	369	2	1970	X 5
EWG1S/1	3/10/88	FID	0	0	0	132297	0	X 1
EWG1S/1	3/11/88	ECD	0	3	417	2	2635	X 5
EWG1S/1	3/11/88	FID	0	0	0	132990	0	X 1

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
EWG1S/1	3/18/88	ECD	0	3	1580	2	2	X 1
EWG1S/1	3/18/88	ECD	0	3	1562	2	5667	X 10
EWG1S/1	3/18/88	FID	0	1	0	305895	0	X 1
EWG1S/1	3/19/88	ECD	0	3	941	2	4221	X 10
EWG1S/1	3/19/88	FID	0	1	0	211903	0	X 1
EWG1S/1	3/20/88	ECD	0	3	708	2	2908	X 10
EWG1S/1	3/20/88	FID	0	0	0	516655	0	X 1
EWG1S/1	3/21/88	ECD	0	3	1	2	1	X 5
EWG1S/1	3/21/88	FID	0	1	0	193428	0	X 1
EWG1S/1	3/22/88	ECD	0	3	529	2	1966	X 5
EWG1S/1	3/22/88	FID	0	0	0	122055	0	X 1
EWG1S/1	3/23/88	ECD	0	3	561	2	2	X 1
EWG1S/1	3/23/88	ECD	0	3	551	2	2414	X 5
EWG1S/1	3/23/88	FID	0	0	0	2004879	0	X 1
EWG1S/1	3/24/88	ECD	0	3	446	2	2	X 1
EWG1S/1	3/24/88	FID	0	0	0	112055	0	X 1
EWG1S/1	3/25/88	ECD	0	3	581	2	2469	X 5
EWG1S/1	3/25/88	FID	0	0	0	156681	0	X 1
EWG1S/1	3/26/88	ECD	0	3	579	2	1893	X 5
EWG1S/1	3/26/88	FID	0	0	0	106158	0	X 1
EWG1S/1	3/27/88	ECD	0	3	788	2	2274	X 5
EWG1S/1	3/27/88	FID	0	1	0	141105	0	X 1
EWG1S/1	3/28/88	ECD	0	3	395	2	1722	X 5
EWG1S/1	3/28/88	FID	0	0	0	101337	0	X 1
EWG1S/1	3/29/88	ECD	0	3	75	2	310	X 1
EWG1S/1	3/29/88	FID	0	0	0	92829	0	X 1
EWG1S/1	3/30/88	ECD	0	3	339	2	1694	X 5
EWG1S/1	3/30/88	FID	0	0	0	109095	0	X 1
EWG1S/1	3/31/88	ECD	0	3	398	2	1832	X 5
EWG1S/1	3/31/88	FID	0	0	0	109179	0	X 1
EWG1S/1	4/01/88	ECD	0	3	331	2	1614	X 5
EWG1S/1	4/01/88	FID	0	0	0	85168	0	X 1
EWG1S/1	4/02/88	ECD	0	3	230	2	1467	X 5
EWG1S/1	4/02/88	FID	0	0	0	68291	0	X 1
EWG1S/1	4/04/88	ECD	0	3	192	2	945	X 5
EWG1S/1	4/04/88	FID	0	0	0	65815	0	X 1

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
EWG1S/1	4/05/88	ECD	0	3	306	2	1279	X 5
EWG1S/1	4/05/88	FID	0	0	0	69882	0	X 1
EWG1S/1	4/06/88	ECD	0	3	241	2	628	X 1
EWG1S/1	4/06/88	FID	0	0	0	66965	0	X 1
EWG1S/1	4/07/88	ECD	0	3	262	2	2	X 1
EWG1S/1	4/07/88	FID	0	0	0	60721	0	X 1
EWG1S/1	4/08/88	ECD	0	3	172	2	911	X 5
EWG1S/1	4/08/88	FID	0	0	0	72380	0	X 1
EWG1S/1	4/09/88	ECD	0	3	133	2	692	X 5
EWG1S/1	4/09/88	FID	0	0	0	54282	0	X 1
EWG1S/1	4/10/88	ECD	0	3	229	2	850	X 5
EWG1S/1	4/10/88	FID	0	0	0	53082	0	X 1
EWG1S/1	4/11/88	ECD	0	3	147	2	649	X 5
EWG1S/1	4/11/88	FID	0	0	0	47170	0	X 1
EWG1S/1	4/12/88	ECD	1	3	299	2	536	X 1
EWG1S/1	4/12/88	FID	0	0	0	56509	0	X 1
EWG1S/1	4/13/88	ECD	0	3	195	2	627	X 5
EWG1S/1	4/13/88	FID	0	0	0	77648	0	X 1
EWG1S/1	4/14/88	FID	0	0	0	42796	0	X 1
EWG1S/1	4/15/88	FID	0	0	0	49631	0	X 1
EWG1S/1	4/18/88	FID	0	0	0	43816	0	X 1

0 = Below Detection Limit
1 = Below Quantitation Limit (Trace)
2 = Above Quantitation Limit
3 = Not quantified due to matrix interference

ACTIVE TREATMENT

EXTRACTION WELL #1 DEEP (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
EWG1D/1	2/11/88	ECD	0	3	14541	2	1	X 200
EWG1D/1	2/11/88	FID	0	91779	1	1257080	1	X 1
EWG1D/2	2/11/88	ECD	0	3	1	2	0	X 200
EWG1D/2	2/11/88	FID	0	60885	0	634608	0	X 1
EWG1D/1	2/12/88	ECD	0	3	3092	2	0	X 100
EWG1D/1	2/12/88	FID	0	74718	0	439688	0	X 1
EWG1D/2	2/12/88	ECD	0	3	3055	2	0	X 100
EWG1D/2	2/12/88	FID	0	54561	0	345116	0	X 1
EWG1D/1	2/13/88	ECD	0	3	1	2	0	X 100
EWG1D/1	2/13/88	FID	0	37470	0	262679	0	X 1
EWG1D/2	2/13/88	ECD	0	3	1	2	0	X 100
EWG1D/2	2/13/88	FID	0	1	0	214647	0	X 1
EWG1D/1	2/14/88	ECD	0	3	1	2	0	X 100
EWG1D/1	2/14/88	FID	0	1	0	157712	0	X 1
EWG1D/2	2/14/88	ECD	0	3	1	2	0	X 100
EWG1D/2	2/14/88	FID	0	1	0	195439	0	X 1
EWG1D/1	2/15/88	ECD	0	3	1	2	0	X 100
EWG1D/1	2/15/88	FID	0	1	0	689956	0	X 1
EWG1D/2	2/15/88	ECD	0	3	1	2	2512	X 100
EWG1D/2	2/15/88	FID	0	1	0	273039	0	X 1
EWG1D/1	2/16/88	ECD	0	3	1	2	0	X 100
EWG1D/1	2/16/88	FID	0	1	0	134938	0	X 1
EWG1D/2	2/16/88	ECD	0	3	1	2	0	X 50
EWG1D/2	2/16/88	FID	0	1	0	161134	0	X 1
EWG1D/1	2/17/88	ECD	0	3	1	2	0	X 50
EWG1D/1	2/17/88	FID	0	1	0	124723	0	X 1
EWG1D/2	2/17/88	ECD	0	3	1	2	1	X 50
EWG1D/2	2/17/88	FID	0	1	0	143324	0	X 1
EWG1D/1	2/18/88	ECD	0	3	817	2	484	X 1
EWG1D/1	2/18/88	FID	0	1	0	116938	0	X 1
EWG1D/1	2/19/88	ECD	0	3	1	2	0	X 50
EWG1D/1	2/19/88	FID	0	1	0	95926	0	X 1
EWG1D/1	2/20/88	ECD	0	3	1	2	1	X 50
EWG1D/1	2/20/88	FID	0	1	0	96668	0	X 1
EWG1D/1	2/21/88	ECD	0	3	702	2	452	X 1
EWG1D/1	2/21/88	FID	0	1	0	92922	0	X 1
EWG1D/1	2/22/88	ECD	0	3	640	2	378	X 1
EWG1D/1	2/22/88	FID	0	0	0	86977	0	X 1

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
EWG1D/1	2/23/88	ECD	0	3	742	2	525	X 1
EWG1D/1	2/23/88	FID	0	1	0	95532	0	X 1
EWG1D/1	2/24/88	ECD	0	3	1	2	0	X 25
EWG1D/1	2/24/88	FID	0	1	0	262091	0	X 1
EWG1D/1	2/25/88	ECD	0	3	325	2	188	X 5
EWG1D/1	2/25/88	FID	0	0	0	216080	0	X 1
EWG1D/1	2/26/88	ECD	0	3	476	2	223	X 5
EWG1D/1	2/26/88	FID	0	1	0	81259	0	X 1
EWG1D/1	2/29/88	ECD	0	3	3028	2	931	X 5
EWG1D/1	2/29/88	FID	0	1	0	144659	0	X 1
EWG1D/1	3/01/88	ECD	0	3	1208	2	594	X 5
EWG1D/1	3/01/88	FID	0	1	0	121213	0	X 1
EWG1D/1	3/02/88	ECD	0	3	661	2	1658	X 10
EWG1D/1	3/02/88	FID	0	1	0	109979	0	X 1
EWG1D/1	3/03/88	ECD	0	3	375	2	1	X 10
EWG1D/1	3/03/88	FID	0	1	0	99740	0	X 1
EWG1D/1	3/04/88	ECD	0	3	335	2	831	X 10
EWG1D/1	3/04/88	FID	0	1	0	167594	0	X 1
EWG1D/1	3/05/88	ECD	0	3	1	2	1	X 20
EWG1D/1	3/05/88	FID	0	1	0	127138	0	X 1
EWG1D/1	3/06/88	ECD	0	3	702	2	1193	X 10
EWG1D/1	3/06/88	FID	0	1	0	102666	0	X 1
EWG1D/1	3/07/88	ECD	0	3	636	2	1	X 5
EWG1D/1	3/07/88	FID	0	1	0	110436	0	X 1
EWG1D/1	3/08/88	ECD	0	3	837	2	1430	X 10
EWG1D/1	3/08/88	FID	0	1	0	218785	0	X 1
EWG1D/1	3/09/88	ECD	0	3	554	2	809	X 10
EWG1D/1	3/09/88	FID	0	1	0	2666895	0	X 1
EWG1D/1	3/10/88	ECD	0	3	696	2	622	X 1
EWG1D/1	3/10/88	FID	0	1	0	94446	0	X 1
EWG1D/1	3/11/88	ECD	0	3	625	2	625	X 1
EWG1D/1	3/11/88	FID	0	1	0	87586	0	X 1
EWG1D/1	3/18/88	ECD	0	3	10905	2	2148	X 50
EWG1D/1	3/18/88	FID	0	74997	0	1115636	0	X 1

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
EWG1D/1	3/19/88	ECD	0	3	727	2	1132	X 10
EWG1D/1	3/19/88	FID	0	1	0	142346	0	X 1
EWG1D/1	3/20/88	ECD	0	3	540	2	1269	X 10
EWG1D/1	3/20/88	FID	0	1	0	96493	0	X 1
EWG1D/1	3/21/88	ECD	0	3	509	2	613	X 1
EWG1D/1	3/21/88	FID	0	1	0	70192	0	X 1
EWG1D/1	3/22/88	ECD	0	3	508	2	554	X 1
EWG1D/1	3/22/88	FID	0	1	0	67721	0	X 1
EWG1D/1	3/23/88	ECD	0	3	385	2	639	X 1
EWG1D/1	3/23/88	FID	0	0	0	45958	0	X 1
EWG1D/1	3/24/88	ECD	0	3	381	2	499	X 1
EWG1D/1	3/24/88	FID	0	0	0	57996	0	X 1
EWG1D/1	3/25/88	ECD	0	3	433	2	519	X 1
EWG1D/1	3/25/88	FID	0	1	0	51518	0	X 1
EWG1D/1	3/26/88	ECD	0	3	320	2	648	X 5
EWG1D/1	3/26/88	FID	0	0	0	72637	0	X 1
EWG1D/1	3/27/88	ECD	0	3	434	2	570	X 1
EWG1D/1	3/27/88	FID	0	0	0	45482	0	X 1
EWG1D/1	3/28/88	ECD	0	3	290	2	376	X 1
EWG1D/1	3/28/88	FID	0	0	0	31938	0	X 1
EWG1D/1	3/29/88	ECD	0	3	326	2	554	X 1
EWG1D/1	3/29/88	FID	0	0	0	67421	0	X 1
EWG1D/1	3/30/88	ECD	0	3	502	2	584	X 1
EWG1D/1	3/30/88	FID	0	1	0	72730	0	X 1
EWG1D/1	3/31/88	ECD	0	3	500	2	725	X 5
EWG1D/1	3/31/88	FID	0	1	0	73637	0	X 1
EWG1D/1	4/01/88	ECD	0	3	649	2	776	X 5
EWG1D/1	4/01/88	FID	0	1	0	89399	0	X 1
EWG1D/1	4/02/88	ECD	0	3	265	2	555	X 5
EWG1D/1	4/02/88	FID	0	0	0	66178	0	X 1
EWG1D/1	4/04/88	ECD	0	3	514	2	528	X 5
EWG1D/1	4/04/88	FID	0	1	0	70791	0	X 1
EWG1D/1	4/05/88	ECD	0	3	711	2	560	X 1
EWG1D/1	4/05/88	FID	0	1	0	67643	0	X 1
EWG1D/1	4/06/88	ECD	0	3	481	2	397	X 1

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
EWG1D/1	4/06/88	FID	0	1	0	59178	0	X 1
EWG1D/1	4/07/88	ECD	0	3	408	2	452	X 1
EWG1D/1	4/07/88	FID	0	0	0	44822	0	X 1
EWG1D/1	4/08/88	ECD	0	3	287	2	360	X 5
EWG1D/1	4/08/88	FID	0	0	0	45669	0	X 1
EWG1D/1	4/09/88	ECD	0	3	181	2	280	X 5
EWG1D/1	4/09/88	FID	0	0	0	42472	0	X 1
EWG1D/1	4/10/88	ECD	0	3	238	2	337	X 5
EWG1D/1	4/10/88	FID	0	0	0	35820	0	X 1
EWG1D/1	4/11/88	ECD	0	3	203	2	368	X 5
EWG1D/1	4/11/88	FID	0	0	0	43016	0	X 1
EWG1D/1	4/12/88	ECD	1	3	2320	2	278	X 1
EWG1D/1	4/12/88	FID	0	0	0	31699	0	X 1
EWG1D/1	4/13/88	ECD	0	3	227	2	293	X 1
EWG1D/1	4/13/88	FID	0	0	0	31988	0	X 1
EWG1D/1	4/14/88	FID	0	0	0	32574	0	X 1
EWG1D/1	4/15/88	FID	0	0	0	40483	0	X 1
EWG1D/1	4/18/88	FID	0	0	0	1	0	X 1

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1 = Below Quantitation Limit (Trace)
2 = Above Quantitation Limit
3 = Not quantified due to matrix interference

ACTIVE TREATMENT

EXTRACTION WELL #2 SHALLOW (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
EWG2S/1	2/11/88	ECD	0	3	5572	2	1	X 200
EWG2S/1	2/11/88	FID	0	60811	0	1272753	0	X 1
EWG2S/1	2/12/88	ECD	0	3	1	2	5289	X 200
EWG2S/1	2/12/88	FID	124571	38521	0	689102	0	X 1
EWG2S/1	2/13/88	ECD	0	3	1	2	0	X 200
EWG2S/1	2/13/88	FID	0	38729	0	810465	0	X 1
EWG2S/1	2/14/88	ECD	0	3	1	2	1	X 100
EWG2S/1	2/14/88	FID	0	1	0	621990	0	X 1
EWG2S/1	2/15/88	ECD	0	3	2180	2	1336	X 50
EWG2S/1	2/15/88	FID	0	1	0	682672	0	X 1
EWG2S/1	2/16/88	ECD	0	3	1396	2	1904	X 50
EWG2S/1	2/16/88	FID	0	33832	0	878263	0	X 1
EWG2S/1	2/17/88	ECD	0	3	1107	2	1672	X 50
EWG2S/1	2/17/88	FID	0	1	0	1230459	0	X 1
EWG2S/1	2/18/88	ECD	0	3	927	2	1707	X 25
EWG2S/1	2/18/88	FID	0	1	0	655905	0	X 1
EWG2S/1	2/20/88	ECD	0	3	769	2	1814	X 25
EWG2S/1	2/20/88	FID	0	1	0	449476	0	X 1
EWG2S/1	2/22/88	ECD	0	3	1	2	1	X 25
EWG2S/1	2/22/88	FID	0	0	0	125478	0	X 1
EWG2S/1	2/24/88	ECD	0	3	407	2	1837	X 5
EWG2S/1	2/24/88	FID	0	51073	0	108053	0	X 1
EWG2S/1	2/26/88	ECD	0	3	1	2	618	X 10
EWG2S/1	2/26/88	FID	0	1	0	322210	0	X 1
EWG2S/1	3/01/88	ECD	0	3	343	2	740	X 5
EWG2S/1	3/01/88	FID	0	0	0	86634	0	X 1
EWG2S/1	3/03/88	ECD	0	3	393	2	5626	X 20
EWG2S/1	3/03/88	FID	0	1	0	199502	0	X 1
EWG2S/1	3/05/88	ECD	0	3	1	2	1	X 20
EWG2S/1	3/05/88	FID	0	1	0	229233	0	X 1
EWG2S/1	3/07/88	ECD	0	3	251	2	2204	X 5
EWG2S/1	3/07/88	FID	0	1	0	178658	0	X 1
EWG2S/1	3/09/88	ECD	0	3	294	2	2212	X 10

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
EWG2S/1	3/09/88	FID	0	1	0	480025	0	X 1
EWG2S/1	3/11/88	ECD	0	3	484	2	4630	X 10
EWG2S/1	3/11/88	FID	0	1	0	315384	0	X 1
EWG2S/1	3/18/88	ECD	0	3	1324	2	5056	X 10
EWG2S/1	3/18/88	FID	0	1	0	394616	0	X 1
EWG2S/1	3/19/88	ECD	0	3	453	2	3532	X 10
EWG2S/1	3/19/88	FID	0	1	0	233238	0	X 1
EWG2S/1	3/21/88	ECD	0	3	368	2	2164	X 5
EWG2S/1	3/21/88	FID	0	1	0	225472	0	X 1
EWG2S/1	3/23/88	ECD	0	3	319	2	2418	X 5
EWG2S/1	3/23/88	FID	0	1	0	184630	0	X 1
EWG2S/1	3/25/88	ECD	0	3	326	2	2693	X 5
EWG2S/1	3/25/88	FID	0	1	0	204134	0	X 1
EWG2S/1	3/27/88	ECD	0	3	179	2	496	X 1
EWG2S/1	3/27/88	FID	0	0	0	40682	0	X 1
EWG2S/1	3/29/88	ECD	0	3	146	2	2130	X 5
EWG2S/1	3/29/88	FID	0	0	0	142527	0	X 1
EWG2S/1	3/31/88	ECD	0	3	1	2	1241	X 10
EWG2S/1	3/31/88	FID	0	0	0	153289	0	X 1
EWG2S/1	4/02/88	ECD	0	3	0	2	1219	X 25
EWG2S/1	4/02/88	FID	0	0	0	172299	0	X 1
EWG2S/1	4/05/88	ECD	0	3	208	2	1630	X 5
EWG2S/1	4/05/88	FID	0	0	0	131769	0	X 1
EWG2S/1	4/07/88	ECD	1	3	209	2	2	X 1
EWG2S/1	4/07/88	FID	0	0	0	108594	0	X 1
EWG2S/1	4/09/88	ECD	0	3	114	2	977	X 5
EWG2S/1	4/09/88	FID	0	0	0	113243	0	X 1
EWG2S/1	4/11/88	ECD	0	3	143	2	943	X 5
EWG2S/1	4/11/88	FID	0	0	0	109251	0	X 1
EWG2S/1	4/13/88	ECD	0	3	386	2	865	X 5
EWG2S/1	4/13/88	FID	0	0	0	103214	0	X 1
EWG2S/1	4/15/88	FID	0	0	0	124021	0	X 1
EWG2S/1	4/18/88	FID	0	0	0	116660	0	X 1

ACTIVE TREATMENT

EXTRACTION WELL #2 DEEP (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
EWG2D/1	2/11/88	ECD	0	3	7755	2	5012	X 200
EWG2D/1	2/11/88	FID	0	101896	0	1273262	0	X 1
EWG2D/1	2/12/88	ECD	0	3	1	2	3518	X 100
EWG2D/1	2/12/88	FID	0	42721	0	401095	0	X 1
EWG2D/1	2/13/88	ECD	0	3	1	2	3126	X 100
EWG2D/1	2/13/88	FID	0	105306	1	412036	0	X 1
EWG2D/1	2/14/88	ECD	0	3	1	2	2840	X 100
EWG2D/1	2/14/88	FID	0	88661	0	343224	0	X 1
EWG2D/1	2/15/88	ECD	0	3	1856	2	3961	X 50
EWG2D/1	2/15/88	FID	0	90844	0	739946	0	X 1
EWG2D/1	2/16/88	ECD	0	3	1	2	1550	X 50
EWG2D/1	2/16/88	FID	0	60175	0	171921	0	X 1
EWG2D/1	2/17/88	ECD	0	3	832	2	2	X 1
EWG2D/1	2/17/88	ECD	0	3	1	2	1683	X 50
EWG2D/1	2/17/88	FID	0	74091	0	212380	0	X 1
EWG2D/1	2/18/88	ECD	0	3	388	2	1700	X 25
EWG2D/1	2/18/88	FID	0	67657	0	183642	0	X 1
EWG2D/1	2/20/88	ECD	0	3	447	2	2	X 1
EWG2D/1	2/20/88	FID	0	60169	0	1597061	0	X 1
EWG2D/1	2/22/88	ECD	0	3	419	2	2	X 1
EWG2D/1	2/22/88	FID	0	51661	0	100821	0	X 1
EWG2D/1	2/24/88	ECD	0	3	324	2	1678	X 5
EWG2D/1	2/24/88	FID	0	39893	0	86142	0	X 1
EWG2D/1	2/26/88	ECD	0	3	359	2	1506	X 5
EWG2D/1	2/26/88	FID	0	52669	0	94365	0	X 1
EWG2D/1	3/01/88	ECD	0	3	944	2	2849	X 5
EWG2D/1	3/01/88	FID	0	52971	0	135989	0	X 1
EWG2D/1	3/03/88	ECD	0	3	501	2	1399	X 5
EWG2D/1	3/03/88	FID	0	48370	0	102304	0	X 1
EWG2D/1	3/05/88	ECD	0	3	1	2	1	X 20
EWG2D/1	3/05/88	FID	0	52641	0	115184	0	X 1
EWG2D/1	3/07/88	ECD	0	3	0	2	1	X 50
EWG2D/1	3/07/88	FID	0	53413	0	493766	0	X 1

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
EWG2D/1	3/09/88	ECD	0	3	486	2	3117	X 10
EWG2D/1	3/09/88	FID	0	51732	0	188766	0	X 1
EWG2D/1	3/11/88	ECD	0	3	664	2	4716	X 10
EWG2D/1	3/1T/88	FID	0	48115	0	441078	0	X 1
EWG2D/1	3/18/88	ECD	0	3	1857	2	2362	X 5
EWG2D/1	3/18/88	FID	0	56761	0	179839	0	X 1
EWG2D/1	3/19/88	ECD	0	3	504	2	2056	X 10
EWG2D/1	3/19/88	FID	0	52944	0	107266	0	X 1
EWG2D/1	3/21/88	ECD	0	3	356	2	1122	X 5
EWG2D/1	3/21/88	FID	0	46710	0	89895	0	X 1
EWG2D/1	3/23/88	ECD	0	3	346	2	1840	X 5
EWG2D/1	3/23/88	FID	0	46065	0	122939	0	X 1
EWG2D/1	3/25/88	ECD	0	3	252	2	1305	X 5
EWG2D/1	3/25/88	FID	0	1	0	75105	0	X 1
EWG2D/1	3/27/88	ECD	0	3	401	2	2073	X 5
EWG2D/1	3/27/88	FID	0	45961	0	135523	0	X 1
EWG2D/1	3/29/88	ECD	0	3	312	2	1158	X 5
EWG2D/1	3/29/88	FID	0	1	0	82234	0	X 1
EWG2D/1	3/31/88	ECD	0	3	271	2	695	X 5
EWG2D/1	3/31/88	FID	0	1	0	71788	0	X 1
EWG2D/1	4/02/88	ECD	0	3	0	2	1176	X 25
EWG2D/1	4/02/88	FID	0	1	0	89645	0	X 1
EWG2D/1	4/05/88	ECD	0	3	617	2	1023	X 5
EWG2D/1	4/05/88	FID	0	45353	0	117396	0	X 1
EWG2D/1	4/07/88	ECD	0	3	482	2	547	X 1
EWG2D/1	4/07/88	FID	0	42967	0	85542	0	X 1
EWG2D/1	4/09/88	ECD	0	3	282	2	510	X 5
EWG2D/1	4/09/88	FID	0	42833	0	90844	0	X 1
EWG2D/1	4/11/88	ECD	0	3	250	2	378	X 5
EWG2D/1	4/11/88	FID	0	1	0	85594	0	X 1
EWG2D/1	4/13/88	ECD	0	3	1	2	538	X 25
EWG2D/1	4/13/88	FID	0	1	0	386403	0	X 1
EWG2D/1	4/15/88	FID	0	1	0	80409	0	X 1
EWG2D/1	4/18/88	FID	0	1	0	60522	0	X 1

ACTIVE TREATMENT

EXTRACTION WELL #3 SHALLOW (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
EWG3S/1	2/11/88	ECD	0	3	59190	2	8653	X 333
EWG3S/1	2/11/88	FID	0	201471	1	7280338	1	X 1
EWG3S/1	2/12/88	ECD	0	3	49790	2	10649	X 200
EWG3S/1	2/12/88	FID	0	158018	1	5991336	1	X 1
EWG3S/1	2/13/88	ECD	0	3	40371	2	21494	X 200
EWG3S/1	2/13/88	FID	0	121755	1	4881273	0	X 1
EWG3S/1	2/14/88	ECD	0	3	24029	2	8038	X 200
EWG3S/1	2/14/88	FID	0	92902	1	4132960	0	X 1
EWG3S/1	2/15/88	ECD	0	3	24030	2	10310	X 200
EWG3S/1	2/15/88	FID	0	103367	1	4623895	1	X 1
EWG3S/1	2/16/88	ECD	0	3	10626	2	8848	X 200
EWG3S/1	2/16/88	FID	0	87897	1	4295493	0	X 1
EWG3S/1	2/17/88	ECD	0	3	1669	2	4080	X 50
EWG3S/1	2/17/88	FID	0	1	0	852421	0	X 1
EWG3S/1	2/18/88	ECD	0	3	2265	2	5191	X 50
EWG3S/1	2/18/88	FID	0	1	0	1144811	0	X 1
EWG3S/1	2/20/88	ECD	0	3	4507	2	2	X 1
EWG3S/1	2/20/88	FID	0	1	0	1130521	0	X 1
EWG3S/1	2/22/88	ECD	0	3	7451	2	8962	X 25
EWG3S/1	2/22/88	FID	0	54328	0	2695682	0	X 1
EWG3S/1	2/24/88	ECD	0	3	4133	2	10754	X 50
EWG3S/1	2/24/88	FID	0	40756	0	2390893	0	X 1
EWG3S/1	2/26/88	ECD	0	3	1	2	4865	X 200
EWG3S/1	2/26/88	FID	0	40601	0	2304711	0	X 1
EWG3S/1	3/01/88	ECD	0	3	3943	2	9000	X 100
EWG3S/1	3/01/88	FID	0	41440	0	2545280	0	X 1
EWG3S/1	3/03/88	ECD	0	3	3202	2	12956	X 25
EWG3S/1	3/03/88	FID	0	37682	0	2004823	0	X 1
EWG3S/1	3/05/88	ECD	0	3	1810	2	5603	X 50
EWG3S/1	3/05/88	FID	0	41304	0	2009856	0	X 1
EWG3S/1	3/07/88	ECD	0	3	1533	2	7502	X 50
EWG3S/1	3/07/88	FID	0	1	0	1302454	0	X 1
EWG3S/1	3/09/88	ECD	0	3	1976	2	13890	X 50

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
EWG3S/1	3/09/88	FID	0	44830	0	2027836	0	X 1
EWG3S/1	3/11/88	ECD	0	3	1183	2	7022	X 33
EWG3S/1	3/11/88	FID	0	1	0	1134867	0	X 1
EWG3S/1	3/18/88	ECD	0	3	2745	2	22550	X 50
EWG3S/1	3/18/88	FID	0	55253	0	2641928	0	X 1
EWG3S/1	3/19/88	ECD	0	3	2152	2	18028	X 50
EWG3S/1	3/19/88	FID	0	1	0	1752610	0	X 1
EWG3S/1	3/21/88	ECD	0	3	1161	2	9446	X 50
EWG3S/1	3/21/88	FID	0	1	0	1203973	0	X 1
EWG3S/1	3/23/88	ECD	0	3	1511	2	11739	X 25
EWG3S/1	3/23/88	FID	0	1	0	1269473	0	X 1
EWG3S/1	3/25/88	ECD	0	3	1024	2	10118	X 25
EWG3S/1	3/25/88	FID	0	1	0	1169734	0	X 1
EWG3S/1	3/27/88	ECD	0	3	2345	2	20938	X 50
EWG3S/1	3/27/88	FID	0	1	0	1930836	0	X 1
EWG3S/1	3/29/88	ECD	0	3	1385	2	20433	X 50
EWG3S/1	3/29/88	FID	0	1	0	1739464	0	X 1
EWG3S/1	3/31/88	ECD	0	3	1155	2	10185	X 33
EWG3S/1	3/31/88	FID	0	1	0	1225469	0	X 1
EWG3S/1	4/02/88	ECD	0	3	1	2	7529	X 40
EWG3S/1	4/02/88	FID	0	1	0	1077224	0	X 1
EWG3S/1	4/05/88	ECD	0	3	1373	2	13450	X 25
EWG3S/1	4/05/88	FID	0	1	0	1451830	0	X 1
EWG3S/1	4/07/88	ECD	0	3	887	2	7859	X 25
EWG3S/1	4/07/88	FID	0	1	0	873621	0	X 1
EWG3S/1	4/09/88	ECD	0	3	543	2	6694	X 25
EWG3S/1	4/09/88	FID	0	1	0	1169109	0	X 1
EWG3S/1	4/11/88	ECD	0	3	447	2	3058	X 25
EWG3S/1	4/11/88	FID	0	1	0	473521	0	X 1
EWG3S/1	4/13/88	ECD	0	3	703	2	5714	X 10
EWG3S/1	4/13/88	FID	0	0	0	377367	0	X 1
EWG3S/1	4/15/88	FID	0	1	0	606231	0	X 1
EWG3S/1	4/18/88	FID	0	1	0	477198	0	X 1

ACTIVE TREATMENT

EXTRACTION WELL #3 DEEP (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
EWG3D/1	2/11/88	ECD	0	3	40117	2	9516	X 200
EWG3D/1	2/11/88	FID	0	263412	1	3389465	0	X 1
EWG3D/1	2/12/88	ECD	0	3	20084	2	11036	X 100
EWG3D/1	2/12/88	FID	0	261627	1	1922794	0	X 1
EWG3D/1	2/13/88	ECD	0	3	32399	2	9385	X 200
EWG3D/1	2/13/88	FID	0	347327	1	2094873	0	X 1
EWG3D/1	2/14/88	ECD	0	3	21430	2	13225	X 200
EWG3D/1	2/14/88	FID	0	254914	1	2136282	0	X 1
EWG3D/1	2/15/88	ECD	0	3	22403	2	16141	X 50
EWG3D/1	2/15/88	FID	0	178342	0	1790192	0	X 1
EWG3D/1	2/16/88	ECD	0	3	7667	2	14546	X 50
EWG3D/1	2/16/88	FID	0	137135	0	1521302	0	X 1
EWG3D/1	2/17/88	ECD	0	3	7331	2	13416	X 50
EWG3D/1	2/17/88	FID	0	117214	0	1315248	0	X 1
EWG3D/1	2/18/88	ECD	0	3	3592	2	8780	X 50
EWG3D/1	2/18/88	FID	0	95538	0	1044106	0	X 1
EWG3D/1	2/20/88	ECD	0	3	69385	2	2	X 25
EWG3D/1	2/20/88	FID	0	65259	0	661160	0	X 1
EWG3D/1	2/22/88	ECD	0	3	1796	2	3905	X 25
EWG3D/1	2/22/88	FID	0	61803	0	454617	0	X 1
EWG3D/1	2/24/88	ECD	0	3	1080	2	2151	X 50
EWG3D/1	2/24/88	FID	0	42493	0	561427	0	X 1
EWG3D/1	2/26/88	ECD	0	3	1077	2	2966	X 50
EWG3D/1	2/26/88	FID	0	48503	0	318093	0	X 1
EWG3D/1	3/01/88	ECD	0	3	2907	2	5985	X 10
EWG3D/1	3/01/88	FID	0	53956	0	186286	0	X 1
EWG3D/1	3/03/88	ECD	0	3	3846	2	13019	X 25
EWG3D/1	3/03/88	FID	0	71821	0	487420	0	X 1
EWG3D/1	3/05/88	ECD	0	3	1	2	3245	X 100
EWG3D/1	3/05/88	FID	0	96807	0	465171	0	X 1
EWG3D/1	3/07/88	ECD	0	3	1402	2	3640	X 50
EWG3D/1	3/07/88	FID	0	46160	0	452695	0	X 1
EWG3D/1	3/09/88	ECD	0	3	2284	2	7856	X 50

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
EWG3D/1	3/09/88	FID	0	62923	0	711553	0	X 1
EWG3D/1	3/11/88	ECD	0	3	1833	2	6082	X 25
EWG3D/1	3/11/88	FID	0	52075	0	1063502	0	X 1
EWG3D/1	3/18/88	ECD	0	3	13313	2	2	X 10
EWG3D/1	3/18/88	FID	0	73402	0	900144	0	X 1
EWG3D/1	3/19/88	ECD	0	3	3924	2	6626	X 10
EWG3D/1	3/19/88	FID	0	60718	0	493237	0	X 1.
EWG3D/1	3/21/88	ECD	0	3	2015	2	6110	X 25
EWG3D/1	3/21/88	FID	0	62038	0	626149	0	X 1
EWG3D/1	3/23/88	ECD	0	3	3317	2	2	X 10
EWG3D/1	3/23/88	FID	0	49135	0	559930	0	X 1
EWG3D/1	3/25/88	ECD	0	3	5972	2	16271	X 25
EWG3D/1	3/25/88	FID	0	1	0	397981	0	X 1
EWG3D/1	3/27/88	ECD	0	3	1884	2	8776	X 25
EWG3D/1	3/27/88	FID	0	47719	0	579078	0	X 1
EWG3D/1	3/29/88	ECD	0	3	1776	2	7330	X 25
EWG3D/1	3/29/88	FID	0	45840	0	521124	0	X 1
EWG3D/1	3/31/88	ECD	0	3	1830	2	4889	X 25
EWG3D/1	3/31/88	FID	0	1	0	363936	0	X 1
EWG3D/1	4/02/88	ECD	0	3	1763	2	4091	X 50
EWG3D/1	4/02/88	FID	0	54308	0	430050	0	X 1
EWG3D/1	4/05/88	ECD	0	3	2964	2	4890	X 25
EWG3D/1	4/05/88	FID	0	51894	0	495237	0	X 1
EWG3D/1	4/07/88	ECD	0	3	2412	2	4176	X 33
EWG3D/1	4/07/88	FID	0	52492	0	457592	0	X 1
EWG3D/1	4/09/88	ECD	0	3	1795	2	4396	X 25
EWG3D/1	4/09/88	FID	0	48489	0	438252	0	X 1
EWG3D/1	4/11/88	ECD	0	3	1548	2	3694	X 25
EWG3D/1	4/11/88	FID	0	44052	0	424454	0	X 1
EWG3D/1	4/13/88	ECD	0	3	1825	2	2	X 10
EWG3D/1	4/13/88	FID	0	1	0	316575	0	X 1
EWG3D/1	4/15/88	FID	0	1	0	353783	0	X 1
EWG3D/1	4/18/88	FID	0	1	0	334188	0	X 1

ACTIVE TREATMENT

EXTRACTION WELL #4 SHALLOW (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
EWG4S/1	2/11/88	ECD	0	3	60456	2	20140	X 333
EWG4S/1	2/11/88	FID	0	501453	1	11012952	1	X 1
EWG4S/1	2/12/88	ECD	0	3	50979	2	17690	X 200
EWG4S/1	2/12/88	FID	0	327839	1	8960394	1	X 1
EWG4S/1	2/13/88	ECD	0	3	43601	2	12822	X 200
EWG4S/1	2/13/88	FID	0	241333	1	7390698	1	X 1
EWG4S/1	2/14/88	ECD	0	3	52596	2	33964	X 200
EWG4S/1	2/14/88	FID	0	293576	1	11269011	1	X 1
EWG4S/1	2/15/88	ECD	0	3	44029	2	31080	X 200
EWG4S/1	2/15/88	FID	0	243827	1	9104518	1	X 1
EWG4S/1	2/16/88	ECD	0	3	26700	2	15920	X 200
EWG4S/1	2/16/88	FID	0	250256	1	9577078	1	X 1
EWG4S/1	2/17/88	ECD	0	3	28473	2	25709	X 200
EWG4S/1	2/17/88	FID	0	284006	1	10066186	1	X 1
EWG4S/1	2/18/88	ECD	0	3	29896	2	33005	X 200
EWG4S/1	2/18/88	FID	0	282864	1	10072957	1	X 1
EWG4S/1	2/20/88	ECD	0	3	25548	2	39039	X 200
EWG4S/1	2/20/88	FID	0	262098	0	10344539	1	X 1
EWG4S/1	2/22/88	ECD	0	3	25460	2	23255	X 100
EWG4S/1	2/22/88	FID	0	189295	1	8370122	1	X 1
EWG4S/1	2/24/88	ECD	0	3	24072	2	35317	X 100
EWG4S/1	2/24/88	FID	0	194459	1	9129859	1	X 1
EWG4S/1	2/26/88	ECD	0	3	13420	2	15435	X 200
EWG4S/1	2/26/88	FID	0	160375	1	7423373	1	X 1
EWG4S/1	3/01/88	ECD	0	3	27206	2	0	X 200
EWG4S/1	3/01/88	FID	0	192727	1	9163732	1	X 1
EWG4S/1	3/03/88	ECD	0	3	28409	2	59963	X 200
EWG4S/1	3/03/88	FID	0	119383	0	5668666	0	X 1
EWG4S/1	3/05/88	ECD	0	3	9623	2	11522	X 200
EWG4S/1	3/05/88	FID	0	180807	1	8332832	1	X 1
EWG4S/1	3/07/88	ECD	0	3	9833	2	16890	X 200
EWG4S/1	3/07/88	FID	0	147608	0	6679094	0	X 1
EWG4S/1	3/09/88	ECD	0	3	14826	2	25163	X 200

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
EWG4S/1	3/09/88	FID	0	185228	1	7789541	0	X 1
EWG4S/1	3/11/88	ECD	0	3	13869	2	25831	X 200
EWG4S/1	3/11/88	FID	0	174324	0	7506034	1	X 1
EWG4S/1	3/18/88	ECD	0	3	19534	2	49298	X 200
EWG4S/1	3/18/88	FID	0	262881	1	10096622	1	X 1
EWG4S/1	3/19/88	ECD	0	3	20736	2	48061	X 200
EWG4S/1	3/19/88	FID	0	230325	1	8565937	1	X 1
EWG4S/1	3/21/88	ECD	0	3	11753	2	20308	X 200
EWG4S/1	3/21/88	FID	0	166839	1	5905565	1	X 1
EWG4S/1	3/23/88	ECD	0	3	11269	2	33101	X 200
EWG4S/1	3/23/88	FID	0	167768	1	6562014	1	X 1
EWG4S/1	3/25/88	ECD	0	3	13250	2	39620	X 200
EWG4S/1	3/25/88	FID	0	162070	1	6591108	0	X 1
EWG4S/1	3/27/88	ECD	0	3	15739	2	53822	X 200
EWG4S/1	3/27/88	FID	0	186515	1	7785513	1	X 1
EWG4S/1	3/29/88	ECD	0	3	11474	2	35194	X 200
EWG4S/1	3/29/88	FID	0	161997	1	7258047	0	X 1
EWG4S/1	3/31/88	ECD	0	3	11976	2	27390	X 200
EWG4S/1	3/31/88	FID	0	108322	0	5954157	0	X 1
EWG4S/1	4/02/88	ECD	0	3	7839	2	19894	X 200
EWG4S/1	4/02/88	FID	0	109622	0	5726432	1	X 1
EWG4S/1	4/05/88	ECD	0	3	13178	2	31298	X 200
EWG4S/1	4/05/88	FID	0	140131	0	6078556	0	X 1
EWG4S/1	4/07/88	ECD	0	3	11197	2	25437	X 200
EWG4S/1	4/07/88	FID	0	132524	0	5921278	0	X 1
EWG4S/1	4/09/88	ECD	0	3	8611	2	25505	X 200
EWG4S/1	4/09/88	FID	0	129680	0	5320282	1	X 1
EWG4S/1	4/11/88	ECD	0	3	7489	2	17294	X 200
EWG4S/1	4/11/88	FID	0	113014	0	4577271	0	X 1
EWG4S/1	4/13/88	ECD	0	3	12876	2	11110	X 200
EWG4S/1	4/13/88	FID	0	92211	0	3471174	0	X 1
EWG4S/1	4/15/88	FID	0	131272	0	4905952	1	X 1
EWG4S/1	4/18/88	FID	0	133214	0	5111885	1	X 1

ACTIVE TREATMENT

EXTRACTION WELL #4 DEEP (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
EWG4D/1	2/11/88	ECD	0	3	36679	2	9480	X 200
EWG4D/1	2/11/88	FID	0	304277	1	1921964	1	X 1
EWG4D/1	2/12/88	ECD	0	3	52095	2	18354	X 200
EWG4D/1	2/12/88	FID	0	435232	1	3024487	1	X 1
EWG4D/1	2/13/88	ECD	0	3	46600	2	13706	X 200
EWG4D/1	2/13/88	FID	0	282843	1	2593985	0	X 1
EWG4D/1	2/14/88	ECD	0	3	38271	2	28742	X 100
EWG4D/1	2/14/88	FID	0	234423	1	3079153	0	X 1
EWG4D/1	2/15/88	ECD	0	3	16840	2	9901	X 200
EWG4D/1	2/15/88	FID	0	123301	0	1631889	0	X 1
EWG4D/1	2/16/88	ECD	0	3	14308	2	18585	X 50
EWG4D/1	2/16/88	FID	0	158052	1	2197859	0	X 1
EWG4D/1	2/17/88	ECD	0	3	12399	2	19149	X 50
EWG4D/1	2/17/88	FID	0	136161	0	1836427	0	X 1
EWG4D/1	2/18/88	ECD	0	3	9803	2	13236	X 50
EWG4D/1	2/18/88	FID	0	116361	0	1468266	0	X 1
EWG4D/1	2/20/88	ECD	0	3	7698	2	19415	X 50
EWG4D/1	2/20/88	FID	0	90719	0	1213338	0	X 1
EWG4D/1	2/22/88	ECD	0	3	1760	2	4044	X 25
EWG4D/1	2/22/88	FID	0	37430	0	573997	0	X 1
EWG4D/1	2/24/88	ECD	0	3	2515	2	16544	X 50
EWG4D/1	2/24/88	FID	0	61516	0	2212524	0	X 1
EWG4D/1	2/26/88	ECD	0	3	1	2	10786	X 100
EWG4D/1	2/26/88	FID	0	59230	0	636326	0	X 1
EWG4D/1	3/01/88	ECD	0	3	7435	2	2	X 10
EWG4D/1	3/01/88	FID	0	81694	0	755531	0	X 1
EWG4D/1	3/03/88	ECD	0	3	251	2	696	X 5
EWG4D/1	3/03/88	FID	0	0	0	102668	0	X 1
EWG4D/1	3/05/88	ECD	0	3	1	2	7533	X 100
EWG4D/1	3/05/88	FID	0	47391	0	506933	0	X 1
EWG4D/1	3/07/88	ECD	0	3	4320	2	50069	X 100
EWG4D/1	3/07/88	FID	0	122228	0	1350900	0	X 1
EWG4D/1	3/09/88	ECD	0	3	1	2	7406	X 50

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
EWG4D/1	3/09/88	FID	0	1	0	657989	0	X 1
EWG4D/1	3/11/88	ECD	0	3	2582	2	11131	X 25
EWG4D/1	3/11/88	FID	0	80662	0	852140	0	X 1
EWG4D/1	3/18/88	ECD	0	3	3349	2	22845	X 50
EWG4D/1	3/18/88	FID	0	93885	0	844182	1	X 1
EWG4D/1	3/19/88	ECD	0	3	9307	2	2	X 50
EWG4D/1	3/19/88	FID	0	203637	0	1199477	1	X 1
EWG4D/1	3/21/88	ECD	0	3	2631	2	14608	X 25
EWG4D/1	3/21/88	FID	0	109213	0	712077	0	X 1
EWG4D/1	3/23/88	ECD	0	3	4384	2	2	X 10
EWG4D/1	3/23/88	FID	0	91987	0	719187	1	X 1
EWG4D/1	3/25/88	ECD	0	3	1785	2	3115	X 25
EWG4D/1	3/25/88	FID	0	57079	0	546952	0	X 1
EWG4D/1	3/27/88	ECD	0	3	1	2	1409	X 25
EWG4D/1	3/27/88	FID	0	1	0	88191	0	X 1
EWG4D/1	3/29/88	ECD	0	3	22	2	573	X 1
EWG4D/1	3/29/88	FID	0	0	0	1	0	X 1
EWG4D/1	3/31/88	ECD	0	3	5675	2	14271	X 25
EWG4D/1	3/31/88	FID	0	99119	0	855140	0	X 1
EWG4D/1	4/02/88	ECD	0	3	4665	2	12547	X 100
EWG4D/1	4/02/88	FID	0	122628	0	1018648	0	X 1
EWG4D/1	4/05/88	ECD	0	3	75	2	350	X 1
EWG4D/1	4/05/88	FID	0	0	0	30203	0	X 1
EWG4D/1	4/07/88	ECD	0	3	0	2	252	X 5
EWG4D/1	4/07/88	FID	0	0	0	77340	0	X 1
EWG4D/1	4/09/88	ECD	0	3	0	2	121	X 5
EWG4D/1	4/09/88	FID	0	0	0	0	0	X 1
EWG4D/1	4/11/88	ECD	0	3	3689	2	7199	X 25
EWG4D/1	4/11/88	FID	0	120931	0	657494	0	X 1
EWG4D/1	4/13/88	ECD	0	3	4005	2	6452	X 25
EWG4D/1	4/13/88	FID	0	142875	0	722342	0	X 1
EWG4D/1	4/15/88	FID	0	130772	0	1521913	0	X 1
EWG4D/1	4/18/88	FID	0	177234	0	878011	0	X 1

ACTIVE TREATMENT

VACUUM MONITORING WELL #1 SHALLOW (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
VMWG1S/1	2/11/88	ECD	0	3	1	2	1	X 100
VMWG1S/1	2/14/88	FID	0	78793	0	307266	0	X 1
VMWG1S/1	2/12/88	ECD	0	3	0	2	1	X 100
VMWG1S/1	2/12/88	FID	0	1	0	135783	0	X 1
VMWG1S/1	2/13/88	ECD	0	3	0	2	1	X 100
VMWG1S/1	2/13/88	FID	0	1	0	170837	0	X 1
VMWG1S/1	2/14/88	ECD	0	3	0	2	1	X 100
VMWG1S/1	2/14/88	FID	0	1	0	254879	0	X 1
VMWG1S/1	2/15/88	ECD	0	3	0	2	0	X 50
VMWG1S/1	2/15/88	FID	0	1	0	99050	0	X 1
VMWG1S/1	2/16/88	ECD	0	3	0	2	0	X 50
VMWG1S/1	2/16/88	FID	0	1	0	91155	0	X 1
VMWG1S/1	2/17/88	ECD	0	3	109	2	1250	X 5
VMWG1S/1	2/17/88	FID	0	0	0	339414	0	X 1
VMWG1S/1	2/19/88	ECD	0	3	2267	2	9311	X 25
VMWG1S/1	2/19/88	FID	0	0	0	56598	0	X 1
VMWG1S/1	2/21/88	ECD	1	3	545	2	341	X 1
VMWG1S/1	2/21/88	FID	0	0	0	0	0	X 1
VMWG1S/1	2/23/88	ECD	0	3	53	2	546	X 1
VMWG1S/1	2/23/88	FID	0	0	0	1	0	X 1
VMWG1S/1	2/25/88	ECD	0	3	0	2	234	X 5
VMWG1S/1	2/25/88	FID	0	0	0	40331	0	X 1
VMWG1S/1	2/29/88	ECD	0	3	235	2	681	X 1
VMWG1S/1	2/29/88	FID	0	0	0	46351	0	X 1
VMWG1S/1	3/02/88	ECD	1	3	56	2	279	X 1
VMWG1S/1	3/02/88	FID	0	0	0	0	0	X 1
VMWG1S/1	3/04/88	ECD	8304	3	118	2	114	X 1
VMWG1S/1	3/04/88	FID	0	0	0	1	0	X 1
VMWG1S/1	3/06/88	ECD	0	3	26	2	290	X 1
VMWG1S/1	3/06/88	FID	0	0	0	1	0	X 1
VMWG1S/1	3/08/88	ECD	0	3	54	2	325	X 1
VMWG1S/1	3/08/88	FID	0	0	0	120114	0	X 1
VMWG1S/1	3/10/88	ECD	0	3	47	2	266	X 1

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
VMWG1S/1	3/10/88	FID	0	0	0	1	0	X 1
VMWG1S/1	3/15/88	ECD	0	3	172	2	661	X 1
VMWG1S/1	3/15/88	FID	0	0	0	37167	0	X 1
VMWG1S/1	3/18/88	ECD	0	3	0	2	1	X 50
VMWG1S/1	3/18/88	FID	0	0	0	1666389	0	X 1
VMWG1S/1	3/20/88	ECD	0	3	28	2	219	X 1
VMWG1S/1	3/20/88	FID	0	0	0	48280	0	X 1
VMWG1S/1	3/22/88	ECD	0	3	1	2	186	X 1
VMWG1S/1	3/22/88	FID	0	0	0	46748	0	X 1
VMWG1S/1	3/24/88	ECD	0	3	1	2	190	X 1
VMWG1S/1	3/24/88	FID	0	0	0	0	0	X 1
VMWG1S/1	3/26/88	ECD	0	3	0	2	361	X 10
VMWG1S/1	3/26/88	FID	0	0	0	0	0	X 1
VMWG1S/1	3/28/88	ECD	0	3	51	2	238	X 1
VMWG1S/1	3/28/88	FID	0	0	0	0	0	X 1
VMWG1S/1	3/30/88	ECD	0	3	1	2	550	X 1
VMWG1S/1	3/30/88	FID	0	0	0	1	0	X 1
VMWG1S/1	4/01/88	ECD	0	3	53	2	205	X 1
VMWG1S/1	4/01/88	FID	0	0	0	0	0	X 1
VMWG1S/1	4/04/88	ECD	0	3	349	2	855	X 10
VMWG1S/1	4/04/88	FID	0	0	0	0	0	X 1
VMWG1S/1	4/06/88	ECD	0	3	1	2	101	X 1
VMWG1S/1	4/06/88	FID	0	0	0	0	0	X 1
VMWG1S/1	4/08/88	ECD	0	3	0	2	157	X 5
VMWG1S/1	4/08/88	FID	0	0	0	1	0	X 1
VMWG1S/1	4/10/88	ECD	0	3	0	2	43	X 1
VMWG1S/1	4/10/88	FID	0	0	0	0	0	X 1
VMWG1S/1	4/12/88	FID	0	0	0	0	0	X 1
VMWG1S/1	4/14/88	FID	0	0	0	0	0	X 1
VMWG1S/1	4/21/88	ECD	1	3	102	2	219	X 1
VMWG1S/1	4/21/88	FID	0	0	0	0	0	X 1

ACTIVE TREATMENT

VACUUM MONITORING WELL #1 DEEP (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
VMWG1D/1	2/11/88	ECD	0	3	362	2	122	X 1
VMWG1D/1	2/11/88	FID	0	0	0	35843	0	X 1
VMWG1D/1	2/12/88	ECD	0	3	290	2	159	X 1
VMWG1D/1	2/12/88	FID	0	0	0	1	0	X 1
VMWG1D/1	2/13/88	ECD	0	3	0	2	0	X 50
VMWG1D/1	2/13/88	FID	0	0	0	100816	0	X 1
VMWG1D/1	2/14/88	ECD	0	3	0	2	0	X 50
VMWG1D/1	2/14/88	FID	0	0	0	61621	0	X 1
VMWG1D/1	2/15/88	ECD	0	3	87	2	37	X 1
VMWG1D/1	2/15/88	FID	0	0	0	28178	0	X 1
VMWG1D/1	2/16/88	ECD	0	3	0	2	0	X 50
VMWG1D/1	2/16/88	FID	0	0	0	230737	0	X 1
VMWG1D/1	2/17/88	ECD	0	3	39	2	172	X 1
VMWG1D/1	2/17/88	FID	0	0	0	1	0	X 1
VMWG1D/1	2/19/88	ECD	0	3	1	2	903	X 25
VMWG1D/1	2/19/88	FID	0	0	0	182842	0	X 1
VMWG1D/1	2/21/88	ECD	0	3	24	2	104	X 1
VMWG1D/1	2/21/88	FID	0	0	0	29063	0	X 1
VMWG1D/1	2/23/88	ECD	0	3	31	2	149	X 1
VMWG1D/1	2/23/88	FID	0	0	0	0	0	X 1
VMWG1D/1	2/25/88	ECD	0	3	22	2	57	X 1
VMWG1D/1	2/25/88	FID	0	0	0	48014	0	X 1
VMWG1D/1	2/29/88	ECD	0	3	73	2	430	X 1
VMWG1D/1	2/29/88	FID	0	0	0	0	0	X 1
VMWG1D/1	3/02/88	ECD	0	3	0	2	1	X 10
VMWG1D/1	3/02/88	FID	0	0	0	1	0	X 1
VMWG1D/1	3/04/88	ECD	0	3	41	2	276	X 1
VMWG1D/1	3/04/88	FID	0	0	0	1	0	X 1
VMWG1D/1	3/06/88	ECD	0	3	35	2	325	X 1
VMWG1D/1	3/06/88	FID	0	0	0	1	0	X 1
VMWG1D/1	3/08/88	ECD	0	3	30	2	67	X 1
VMWG1D/1	3/08/88	FID	0	0	0	0	0	X 1
VMWG1D/1	3/10/88	ECD	0	3	28	2	64	X 1

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
VMWG1D/1	3/10/88	FID	0	0	0	0	0	X 1
VMWG1D/1	3/15/88	ECD	0	3	286	2	91	X 1
VMWG1D/1	3/15/88	FID	0	0	0	70168	0	X 1
VMWG1D/1	3/18/88	ECD	0	3	37	2	130	X 1
VMWG1D/1	3/18/88	FID	0	0	0	0	0	X 1
VMWG1D/1	3/20/88	ECD	0	3	50	2	322	X 1
VMWG1D/1	3/20/88	FID	0	0	0	51313	0	X 1
VMWG1D/1	3/22/88	ECD	0	3	83	2	344	X 1
VMWG1D/1	3/22/88	FID	0	0	0	1	0	X 1
VMWG1D/1	3/24/88	ECD	0	3	27	2	322	X 1
VMWG1D/1	3/24/88	FID	0	0	0	1	0	X 1
VMWG1D/1	3/26/88	ECD	0	3	0	2	166	X 5
VMWG1D/1	3/26/88	FID	0	0	0	0	0	X 1
VMWG1D/1	3/28/88	ECD	0	3	22	2	372	X 1
VMWG1D/1	3/28/88	FID	0	0	0	41721	0	X 1
VMWG1D/1	3/30/88	ECD	0	3	1	2	334	X 1
VMWG1D/1	3/30/88	FID	0	0	0	0	0	X 1
VMWG1D/1	4/01/88	ECD	0	3	0	2	1030	X 25
VMWG1D/1	4/01/88	FID	0	0	0	1	0	X 1
VMWG1D/1	4/04/88	ECD	0	3	143	2	311	X 5
VMWG1D/1	4/04/88	FID	0	0	0	0	0	X 1
VMWG1D/1	4/06/88	ECD	0	3	1	2	25	X 1
VMWG1D/1	4/06/88	FID	0	0	0	0	0	X 1
VMWG1D/1	4/08/88	ECD	0	3	27	2	230	X 1
VMWG1D/1	4/08/88	FID	0	0	0	1	0	X 1
VMWG1D/1	4/10/88	ECD	0	3	1	2	1	X 1
VMWG1D/1	4/10/88	FID	0	0	0	87417	0	X 1
VMWG1D/1	4/12/88	FID	0	0	0	0	0	X 1
VMWG1D/1	4/14/88	FID	0	0	0	70763	0	X 1
VMWG1D/1	4/21/88	ECD	0	3	6399	2	1	X 1
VMWG1D/1	4/21/88	FID	0	0	0	0	0	X 1

ACTIVE TREATMENT

VACUUM MONITORING WELL #2 SHALLOW (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
VMWG2S/1	2/11/88	ECD	0	3	1	2	5279	X 200
VMWG2S/1	2/11/88	FID	0	1	0	1609823	0	X 1
VMWG2S/1	2/12/88	ECD	0	3	1	2	2460	X 100
VMWG2S/1	2/12/88	FID	0	1	0	479414	0	X 1
VMWG2S/1	2/13/88	ECD	0	3	1	2	1	X 100
VMWG2S/1	2/13/88	FID	0	1	0	341828	0	X 1
VMWG2S/1	2/14/88	ECD	0	3	1	2	1	X 100
VMWG2S/1	2/14/88	FID	0	1	0	283944	0	X 1
VMWG2S/1	2/15/88	ECD	0	3	1	2	1	X 50
VMWG2S/1	2/15/88	FID	0	1	0	233897	0	X 1
VMWG2S/1	2/16/88	ECD	0	3	1	2	1245	X 50
VMWG2S/1	2/16/88	FID	0	1	0	294440	0	X 1
VMWG2S/1	2/17/88	ECD	0	3	462	2	1317	X 25
VMWG2S/1	2/17/88	FID	0	1	0	204858	0	X 1
VMWG2S/1	2/19/88	ECD	0	3	1	2	1706	X 67
VMWG2S/1	2/19/88	FID	0	1	0	175620	0	X 1
VMWG2S/1	2/21/88	ECD	0	3	1	2	1092	X 25
VMWG2S/1	2/21/88	FID	0	1	0	148085	0	X 1
VMWG2S/1	2/23/88	ECD	0	3	1	2	1812	X 25
VMWG2S/1	2/23/88	FID	0	0	0	91943	0	X 1
VMWG2S/1	2/25/88	ECD	0	3	234	2	368	X 10
VMWG2S/1	2/25/88	FID	0	1	0	124062	0	X 1
VMWG2S/1	2/29/88	ECD	0	3	4679	2	989	X 25
VMWG2S/1	2/29/88	FID	0	1	0	548344	0	X 1
VMWG2S/1	3/02/88	ECD	0	3	1032	2	667	X 1
VMWG2S/1	3/02/88	FID	0	1	0	147015	0	X 1
VMWG2S/1	3/04/88	ECD	0	3	543	2	2023	X 10
VMWG2S/1	3/04/88	FID	0	1	0	155241	0	X 1
VMWG2S/1	3/06/88	ECD	0	3	859	2	1044	X 5
VMWG2S/1	3/06/88	FID	0	1	0	155940	0	X 1
VMWG2S/1	3/08/88	ECD	0	3	682	2	651	X 1
VMWG2S/1	3/08/88	FID	0	0	0	133149	0	X 1
VMWG2S/1	3/10/88	ECD	0	3	496	2	606	X 1

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
VMWG2S/1	3/10/88	FID	0	0	0	106485	0	X 1
VMWG2S/1	3/14/88	ECD	0	3	4322	2	2845	X 10
VMWG2S/1	3/14/88	FID	0	1	0	451413	0	X 1
VMWG2S/1	3/18/88	ECD	0	3	2040	2	2134	X 10
VMWG2S/1	3/18/88	FID	0	1	0	324746	0	X 1
VMWG2S/1	3/20/88	ECD	0	3	558	2	736	X 5
VMWG2S/1	3/20/88	FID	0	0	0	117936	0	X 1
VMWG2S/1	3/22/88	ECD	0	3	429	2	585	X 1
VMWG2S/1	3/22/88	FID	0	0	0	80329	0	X 1
VMWG2S/1	3/24/88	ECD	0	3	1224	2	1697	X 10
VMWG2S/1	3/24/88	FID	0	1	0	179254	0	X 1
VMWG2S/1	3/26/88	ECD	0	3	487	2	779	X 5
VMWG2S/1	3/26/88	FID	0	0	0	84739	0	X 1
VMWG2S/1	3/28/88	ECD	0	3	496	2	1259	X 5
VMWG2S/1	3/28/88	FID	0	1	0	139955	0	X 1
VMWG2S/1	3/30/88	ECD	0	3	271	2	689	X 5
VMWG2S/1	3/30/88	FID	0	0	0	81442	0	X 1
VMWG2S/1	4/01/88	ECD	0	3	486	2	501	X 5
VMWG2S/1	4/01/88	FID	0	0	0	74754	0	X 1
VMWG2S/1	4/04/88	ECD	0	3	486	2	463	X 5
VMWG2S/1	4/04/88	FID	0	0	0	77799	0	X 1
VMWG2S/1	4/06/88	ECD	0	3	888	2	471	X 5
VMWG2S/1	4/06/88	FID	0	1	0	117798	0	X 1
VMWG2S/1	4/08/88	ECD	0	3	524	2	678	X 5
VMWG2S/1	4/08/88	FID	0	0	0	111429	0	X 1
VMWG2S/1	4/10/88	ECD	0	3	345	2	216	X 1
VMWG2S/1	4/10/88	FID	0	0	0	57021	0	X 1
VMWG2S/1	4/12/88	ECD	0	3	743	2	480	X 5
VMWG2S/1	4/12/88	FID	0	0	0	111518	0	X 1
VMWG2S/1	4/14/88	FID	0	0	0	133417	0	X 1
VMWG2S/1	4/21/88	ECD	56536	3	3840	2	189	X 10
VMWG2S/1	4/21/88	FID	0	1	0	318016	0	X 1

ACTIVE TREATMENT

VACUUM MONITORING WELL #2 DEEP (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
VMWG2D/1	2/11/88	ECD	0	3	21448	2	1	X 200
VMWG2D/1	2/11/88	FID	0	249947	1	2727349	0	X 1
VMWG2D/1	2/12/88	ECD	0	3	1	2	1	X 200
VMWG2D/1	2/12/88	FID	0	111617	0	449987	0	X 1
VMWG2D/1	2/13/88	ECD	0	3	1	2	0	X 50
VMWG2D/1	2/13/88	FID	0	1	0	124644	0	X 1
VMWG2D/1	2/14/88	ECD	0	3	1	2	0	X 100
VMWG2D/1	2/14/88	FID	0	47442	0	342445	0	X 1
VMWG2D/1	2/15/88	ECD	0	3	1	2	0	X 100
VMWG2D/1	2/15/88	FID	0	1	0	306594	0	X 1
VMWG2D/1	2/16/88	ECD	0	3	1323	2	1	X 50
VMWG2D/1	2/16/88	FID	0	1	0	363322	0	X 1
VMWG2D/1	2/17/88	ECD	0	3	1762	2	764	X 5
VMWG2D/1	2/17/88	FID	0	1	0	301842	0	X 1
VMWG2D/1	2/19/88	ECD	0	3	1030	2	1	X 50
VMWG2D/1	2/19/88	FID	0	1	0	216029	0	X 1
VMWG2D/1	2/21/88	ECD	0	3	479	2	347	X 1
VMWG2D/1	2/21/88	FID	0	1	0	57995	0	X 1
VMWG2D/1	2/23/88	ECD	0	3	965	2	1	X 25
VMWG2D/1	2/23/88	FID	0	1	0	214929	0	X 1
VMWG2D/1	2/25/88	ECD	0	3	1126	2	1	X 25
VMWG2D/1	2/25/88	FID	0	44521	0	456898	0	X 1
VMWG2D/1	2/29/88	ECD	0	3	33	2	484	X 1
VMWG2D/1	2/29/88	FID	0	0	0	1	0	X 1
VMWG2D/1	3/02/88	ECD	0	3	1479	2	1925	X 10
VMWG2D/1	3/02/88	FID	0	1	0	190207	0	X 1
VMWG2D/1	3/04/88	ECD	0	3	950	2	637	X 10
VMWG2D/1	3/04/88	FID	0	1	0	152692	0	X 1
VMWG2D/1	3/06/88	ECD	0	3	1646	2	1519	X 5
VMWG2D/1	3/06/88	FID	0	1	0	188613	0	X 1
VMWG2D/1	3/08/88	ECD	0	3	1295	2	593	X 5
VMWG2D/1	3/08/88	FID	0	1	0	158759	0	X 1
VMWG2D/1	3/10/88	ECD	0	3	1184	2	506	X 5

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
VMWG2D/1	3/10/88	FID	0	1	0	130972	0	X 1
VMWG2D/1	3/14/88	ECD	0	3	7297	2	3459	X 10
VMWG2D/1	3/14/88	FID	0	54439	0	618666	0	X 1
VMWG2D/1	3/18/88	ECD	0	3	4209	2	1437	X 25
VMWG2D/1	3/18/88	FID	0	1	0	531084	0	X 1
VMWG2D/1	3/20/88	ECD	0	3	2187	2	1676	X 10
VMWG2D/1	3/20/88	FID	0	1	0	503103	0	X 1
VMWG2D/1	3/22/88	ECD	0	3	1698	2	1497	X 5
VMWG2D/1	3/22/88	FID	0	1	0	232096	0	X 1
VMWG2D/1	3/24/88	ECD	0	3	3418	2	2296	X 10
VMWG2D/1	3/24/88	FID	0	1	0	477706	0	X 1
VMWG2D/1	3/26/88	ECD	0	3	2304	2	1753	X 10
VMWG2D/1	3/26/88	FID	0	1	0	358874	0	X 1
VMWG2D/1	3/28/88	ECD	0	3	1825	2	1737	X 10
VMWG2D/1	3/28/88	FID	0	1	0	323391	0	X 1
VMWG2D/1	3/30/88	ECD	0	3	1285	2	1339	X 10
VMWG2D/1	3/30/88	FID	0	1	0	242804	0	X 1
VMWG2D/1	4/01/88	ECD	0	3	1111	2	771	X 5
VMWG2D/1	4/01/88	FID	0	1	0	128613	0	X 1
VMWG2D/1	4/04/88	ECD	0	3	1535	2	913	X 10
VMWG2D/1	4/04/88	FID	0	1	0	252910	0	X 1
VMWG2D/1	4/06/88	ECD	0	3	2361	2	1292	X 10
VMWG2D/1	4/06/88	FID	0	1	0	383199	0	X 1
VMWG2D/1	4/08/88	ECD	0	3	906	2	751	X 10
VMWG2D/1	4/08/88	FID	0	1	0	224685	0	X 1
VMWG2D/1	4/10/88	ECD	0	3	1829	2	977	X 10
VMWG2D/1	4/10/88	FID	0	1	0	329991	0	X 1
VMWG2D/1	4/12/88	ECD	0	3	1934	2	880	X 10
VMWG2D/1	4/12/88	FID	0	1	0	313488	0	X 1
VMWG2D/1	4/14/88	FID	0	1	0	313486	0	X 1
VMWG2D/1	4/21/88	ECD	1	3	4620	2	1074	X 10
VMWG2D/1	4/21/88	FID	0	1	0	350233	0	X 1

ACTIVE TREATMENT

VACUUM MONITORING WELL #3 SHALLOW (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	1,1,1-Tri	Trichloro ethylene	Tetrachloro ethylene	Dilution
VMWG3S/1	2/11/88	ECD	0	3	35328	2	5011	X 200
VMWG3S/1	2/11/88	FID	0	403143	1	4482785	0	X 1
VMWG3S/1	2/12/88	ECD	0	3	81131	2	29470	X 200
VMWG3S/1	2/12/88	FID	0	816933	1	8560688	0	X 1
VMWG3S/1	2/13/88	ECD	0	3	53512	2	22115	X 200
VMWG3S/1	2/13/88	FID	0	564599	1	6339445	0	X 1
VMWG3S/1	2/14/88	ECD	0	3	4139	2	16729	X 100
VMWG3S/1	2/14/88	FID	0	1	0	281935	0	X 1
VMWG3S/1	2/15/88	ECD	0	3	12358	2	10465	X 200
VMWG3S/1	2/15/88	FID	0	136897	0	2287011	0	X 1
VMWG3S/1	2/16/88	ECD	0	3	13946	2	29747	X 100
VMWG3S/1	2/16/88	FID	0	239294	1	4586937	1	X 1
VMWG3S/1	2/17/88	ECD	0	3	10858	2	25500	X 100
VMWG3S/1	2/17/88	FID	0	186465	0	4281694	0	X 1
VMWG3S/1	2/19/88	ECD	0	3	5766	2	19598	X 100
VMWG3S/1	2/19/88	FID	0	125778	0	2254946	0	X 1
VMWG3S/1	2/21/88	ECD	0	3	8026	2	30268	X 50
VMWG3S/1	2/21/88	FID	0	144043	0	2296366	0	X 1
VMWG3S/1	2/23/88	ECD	0	3	3042	2	7747	X 50
VMWG3S/1	2/23/88	FID	0	103666	0	1486262	0	X 1
VMWG3S/1	2/25/88	ECD	0	3	21	2	76	X 1
VMWG3S/1	2/25/88	FID	0	81106	0	1114976	0	X 1
VMWG3S/1	2/29/88	ECD	0	3	139	2	435	X 1
VMWG3S/1	2/29/88	FID	0	0	0	31783	0	X 1
VMWG3S/1	3/02/88	ECD	0	3	2942	2	3994	X 50
VMWG3S/1	3/02/88	FID	0	89684	0	884462	0	X 1
VMWG3S/1	3/04/88	ECD	0	3	3168	2	3827	X 50
VMWG3S/1	3/04/88	FID	0	81095	0	795183	0	X 1
VMWG3S/1	3/06/88	ECD	0	3	2191	2	3740	X 50
VMWG3S/1	3/06/88	FID	0	60502	0	735848	0	X 1
VMWG3S/1	3/08/88	ECD	0	3	3367	2	11066	X 25
VMWG3S/1	3/08/88	FID	0	65513	0	946323	0	X 1
VMWG3S/1	3/10/88	ECD	0	3	2798	2	4758	X 25

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	1,1,1-Tri	Trichloro ethylene	Tetrachloro ethylene	Dilution
VMWG3S/1	3/10/88	FID	0	1	0	604209	0	X 1
VMWG3S/1	3/14/88	ECD	0	3	29166	2	23810	X 100
VMWG3S/1	3/14/88	FID	0	303444	1	3851542	0	X 1
VMWG3S/1	3/18/88	ECD	0	3	10556	2	8490	X 25
VMWG3S/1	3/18/88	FID	0	183420	0	1697383	0	X 1
VMWG3S/1	3/20/88	ECD	0	3	2951	2	6303	X 10
VMWG3S/1	3/20/88	FID	0	67092	0	530583	0	X 1
VMWG3S/1	3/22/88	ECD	0	3	4913	2	6739	X 10
VMWG3S/1	3/22/88	FID	0	123387	0	703143	0	X 1
VMWG3S/1	3/24/88	ECD	0	3	3368	2	3903	X 25
VMWG3S/1	3/24/88	FID	0	184909	0	911746	0	X 1
VMWG3S/1	3/26/88	ECD	0	3	4024	2	5972	X 10
VMWG3S/1	3/26/88	FID	0	102526	0	547248	0	X 1
VMWG3S/1	3/28/88	ECD	0	3	3787	2	2	X 10
VMWG3S/1	3/28/88	FID	0	98129	0	575246	0	X 1
VMWG3S/1	3/30/88	ECD	0	3	2459	2	2	X 10
VMWG3S/1	3/30/88	FID	0	80675	0	406643	0	X 1
VMWG3S/1	4/01/88	ECD	0	3	7163	2	5353	X 25
VMWG3S/1	4/01/88	FID	0	123576	0	629353	0	X 1
VMWG3S/1	4/04/88	ECD	0	3	3933	2	8878	X 25
VMWG3S/1	4/04/88	FID	0	117132	0	582355	0	X 1
VMWG3S/1	4/06/88	ECD	0	3	935	2	766	X 5
VMWG3S/1	4/06/88	FID	0	1	0	128143	0	X 1
VMWG3S/1	4/08/88	ECD	0	3	3053	2	10010	X 25
VMWG3S/1	4/08/88	FID	0	139716	0	700206	0	X 1
VMWG3S/1	4/10/88	ECD	0	3	3649	2	2835	X 25
VMWG3S/1	4/10/88	FID	0	194586	0	726100	0	X 1
VMWG3S/1	4/12/88	ECD	0	3	686	2	666	X 5
VMWG3S/1	4/12/88	FID	0	1	0	109893	0	X 1
VMWG3S/1	4/14/88	FID	0	149208	0	794468	0	X 1
VMWG3S/1	4/21/88	ECD	0	3	22827	2	6732	X 25
VMWG3S/1	4/21/88	FID	0	170198	1	1483036	0	X 1

ACTIVE TREATMENT

VACUUM MONITORING #3D WELLS (ug/cubic meter)

Sample ID	Date	Detectorr Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
VMWG3D/1	2/11/88	ECD	1	3	34008	2	92565	X 200
VMWG3D/1	2/11/88	FID	0	105727	1	1900910	0	X 1
VMWG3D/1	2/12/88	ECD	0	3	17535	2	1	X 200
VMWG3D/1	2/12/88	FID	0	82948	1	1488633	0	X 1
VMWG3D/1	2/13/88	ECD	0	3	18905	2	1	X 200
VMWG3D/1	2/13/88	FID	0	53088	0	910431	0	X 1
VMWG3D/1	2/14/88	ECD	0	3	18964	2	1	X 100
VMWG3D/1	2/14/88	FID	0	59058	0	967890	0	X 1
VMWG3D/1	2/15/88	ECD	0	3	24895	2	1	X 200
VMWG3D/1	2/15/88	FID	0	57297	1	905770	0	X 1
VMWG3D/1	2/16/88	ECD	0	3	14089	2	4385	X 50
VMWG3D/1	2/16/88	FID	0	56545	0	1012988	0	X 1
VMWG3D/1	2/17/88	ECD	0	3	14505	2	3261	X 50
VMWG3D/1	2/17/88	FID	0	59674	0	1090238	0	X 1
VMWG3D/1	2/19/88	ECD	0	3	17066	2	2007	X 50
VMWG3D/1	2/19/88	FID	0	55999	0	864745	0	X 1
VMWG3D/1	2/21/88	ECD	0	3	16088	2	1712	X 50
VMWG3D/1	2/21/88	FID	0	53254	0	798107	0	X 1
VMWG3D/1	2/23/88	ECD	0	3	17263	2	2468	X 50
VMWG3D/1	2/23/88	FID	0	53084	0	790946	0	X 1
VMWG3D/1	2/25/88	ECD	0	3	9804	2	1050	X 25
VMWG3D/1	2/25/88	FID	0	48131	0	617524	0	X 1
VMWG3D/1	2/29/88	ECD	0	3	39	2	689	X 1
VMWG3D/1	2/29/88	FID	0	0	0	42833	0	X 1
VMWG3D/1	3/02/88	ECD	0	3	22596	2	11981	X 25
VMWG3D/1	3/02/88	FID	0	141675	1	1012368	0	X 1
VMWG3D/1	3/04/88	ECD	0	3	13992	2	10318	X 50
VMWG3D/1	3/04/88	FID	0	132212	1	947871	0	X 1
VMWG3D/1	3/06/88	ECD	0	3	10488	2	14881	X 67
VMWG3D/1	3/06/88	FID	0	115997	0	845356	0	X 1
VMWG3D/1	3/08/88	ECD	0	3	11621	2	7963	X 25
VMWG3D/1	3/08/88	FID	0	97968	0	759997	0	X 1
VMWG3D/1	3/10/88	ECD	0	3	7994	2	1618	X 25

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
VMWG3D/1	3/10/88	FID	0	96435	0	705264	0	X 1
VMWG3D/1	3/14/88	ECD	0	3	430721	2	46359	X 200
VMWG3D/1	3/14/88	FID	0	695993	459716	16298184	1	X 1
VMWG3D/1	3/18/88	ECD	0	3	27	2	378	X 1
VMWG3D/1	3/18/88	FID	0	0	0	46145	0	X 1
VMWG3D/1	3/20/88	ECD	0	3	1	2	234	X 1
VMWG3D/1	3/20/88	FID	0	0	0	1	0	X 1
VMWG3D/1	3/22/88	ECD	0	3	1	2	364	X 1
VMWG3D/1	3/22/88	FID	0	0	0	40[illegible]	0	X 1
VMWG3D/1	3/24/88	ECD	0	3	0	2	966	X 10
VMWG3D/1	3/24/88	FID	0	0	0	36656	0	X 1
VMWG3D/1	3/26/88	ECD	0	3	3928	2	2068	X 5
VMWG3D/1	3/26/88	FID	0	1	0	138951	0	X 1
VMWG3D/1	3/28/88	ECD	0	3	451	2	100	X 1
VMWG3D/1	3/28/88	FID	0	0	0	0	0	X 1
VMWG3D/1	3/30/88	ECD	0	3	17426	2	7733	X 25
VMWG3D/1	3/30/88	FID	0	125352	0	1020293	0	X 1
VMWG3D/1	4/01/88	ECD	0	3	14044	2	5247	X 25
VMWG3D/1	4/01/88	FID	0	92955	0	700795	0	X 1
VMWG3D/1	4/04/88	ECD	0	3	16431	2	6099	X 25
VMWG3D/1	4/04/88	FID	0	89395	0	739361	0	X 1
VMWG3D/1	4/06/88	ECD	0	3	2455	2	3821	X 10
VMWG3D/1	4/06/88	FID	0	1	0	245730	0	X 1
VMWG3D/1	4/08/88	ECD	0	3	1543	2	6392	X 25
VMWG3D/1	4/08/88	FID	0	67535	0	360122	0	X 1
VMWG3D/1	4/10/88	ECD	0	3	2035	2	2	X 10
VMWG3D/1	4/10/88	FID	0	61118	0	300700	0	X 1
VMWG3D/1	4/12/88	FID	0	1	0	78642	0	X 1
VMWG3D/1	4/14/88	FID	0	80855	0	544169	0	X 1
VMWG3D/1	4/21/88	ECD	0	3	596128	2	29026	X 200
VMWG3D/1	4/21/88	FID	0	911813	566737	17670335	1	X 1

ACTIVE TREATMENT

VACUUM MONITORING WELL #4 SHALLOW (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
VMWG4S/1	2/11/88	ECD	0	3	282	2	574	X 1
VMWG4S/1	2/11/88	FID	0	1	0	40640	0	X 1
VMWG4S/1	2/12/88	ECD	0	3	157	2	360	X 1
VMWG4S/1	2/12/88	FID	0	0	0	1	0	X 1
VMWG4S/1	2/13/88	ECD	0	3	1	2	2952	X 25
VMWG4S/1	2/13/88	FID	0	0	0	69887	0	X 1
VMWG4S/1	2/14/88	ECD	0	3	141	2	329	X 1
VMWG4S/1	2/14/88	FID	0	0	0	1	0	X 1
VMWG4S/1	2/15/88	ECD	0	3	0	2	1	X 100
VMWG4S/1	2/15/88	FID	0	1	0	315471	0	X 1
VMWG4S/1	2/16/88	ECD	0	3	137	2	673	X 1
VMWG4S/1	2/16/88	FID	0	0	0	49211	0	X 1
VMWG4S/1	2/17/88	ECD	0	3	0	2	0	X 50
VMWG4S/1	2/17/88	FID	0	0	0	916955	0	X 1
VMWG4S/1	2/19/88	ECD	0	3	96	2	389	X 1
VMWG4L/1	2/19/88	FID	0	0	0	29400	0	X 1
VMWG4S/1	2/21/88	FID	0	0	0	76253	0	X 1
VMWG4S/1	2/22/88	ECD	0	3	44	2	461	X 1
VMWG4S/1	2/23/88	ECD	0	3	72	2	264	X 1
VMWG4S/1	2/23/88	FID	0	0	0	31785	0	X 1
VMWG4S/1	2/25/88	ECD	0	3	0	2	1	X 100
VMWG4S/1	2/25/88	FID	0	0	0	120023	0	X 1
VMWG4S/1	2/29/88	ECD	0	3	73	2	584	X 1
VMWG4S/1	2/29/88	FID	0	0	0	30222	0	X 1
VMWG4S/1	3/02/88	ECD	0	3	239	2	1468	X 5
VMWG4S/1	3/02/88	FID	0	0	0	103610	0	X 1
VMWG4S/1	3/04/88	ECD	0	3	51	2	299	X 1
VMWG4S/1	3/04/88	FID	0	0	0	1	0	X 1
VMWG4S/1	3/06/88	ECD	0	3	1	2	250	X 1
VMWG4S/1	3/06/88	FID	0	0	0	90959	0	X 1
VMWG4S/1	3/08/88	ECD	0	3	40	2	205	X 1
VMWG4S/1	3/08/88	FID	0	0	0	1	0	X 1

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
VMWG4S/1	3/10/88	ECD	0	3	0	2	231	x 5
VMWG4S/1	3/10/88	FID	0	0	0	277908	0	x 1
VMWG4S/1	3/15/88	ECD	0	3	179	2	652	x 1
VMWG4S/1	3/15/88	FID	0	0	0	38857	0	x 1
VMWG4S/1	3/18/88	ECD	0	3	30	2	428	x 1
VMWG4S/1	3/18/88	FID	0	0	0	56614	0	x 1
VMWG4S/1	3/20/88	ECD	0	3	1	2	446	x 1
VMWG4S/1	3/20/88	FID	0	0	0	1	0	x 1
VMWG4S/1	3/22/88	ECD	0	3	1	2	254	x 1
VMWG4S/1	3/22/88	FID	0	0	0	1	0	x 1
VMWG4S/1	3/24/88	ECD	0	3	0	2	476	x 10
VMWG4S/1	3/24/88	FID	0	0	0	1	0	x 1
VMWG4S/1	3/26/88	ECD	0	3	0	2	327	x 5
VMWG4S/1	3/26/88	FID	0	0	0	66744	0	x 1
VMWG4S/1	3/28/88	ECD	0	3	0	2	1438	x 5
VMWG4S/1	3/28/88	FID	0	0	0	92704	0	x 1
VMWG4S/1	3/30/88	ECD	0	3	0	2	802	x 5
VMWG4S/1	3/30/88	FID	0	0	0	60696	0	x 1
VMWG4S/1	4/01/88	ECD	0	3	0	2	998	x 25
VMWG4S/1	4/01/88	FID	0	0	0	0	0	x 1
VMWG4S/1	4/04/88	ECD	0	3	0	2	333	x 5
VMWG4S/1	4/04/88	FID	0	0	0	1	0	x 1
VMWG4S/1	4/06/88	ECD	0	3	0	2	340	x 10
VMWG4S/1	4/06/88	FID	0	0	0	1	0	x 1
VMWG4S/1	4/08/88	ECD	0	3	0	2	173	x 5
VMWG4S/1	4/08/88	FID	0	0	0	1	0	x 1
VMWG4S/1	4/10/88	ECD	0	3	0	2	35	x 1
VMWG4S/1	4/10/88	FID	0	0	0	0	0	x 1
VMWG4S/1	4/12/88	FID	0	0	0	0	0	x 1
VMWG4S/1	4/14/88	FID	0	0	0	0	0	x 1
VMWG4S/1	4/22/88	ECD	0	3	275	2	588	x 1
VMWG4S/1	4/22/88	FID	0	0	0	1	0	x 1

ACTIVE TREATMENT

VACUUM MONITORING WELL #4 DEEP (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
VMWG4D/1	2/11/88	ECD	0	3	155804	2	62127	X 200
VMWG4D/1	2/1T/88	FID	0	0	0	47695	0	X 1
VMWG4D/1	2/12/88	ECD	0	3	185	2	86	X 1
VMWG4D/1	2/12/88	FID	0	0	0	1	0	X 1
VMWG4D/1	2/13/88	ECD	0	3	92	2	76	X 1
VMWG4D/1	2/13/88	FID	0	0	0	45198	0	X 1
VMWG4D/1	2/14/88	ECD	0	3	0	2	0	X 100
VMWG4D/1	2/14/88	FID	0	0	0	84322	0	X 1
VMWG4D/1	2/15/88	ECD	0	3	0	2	1	X 50
VMWG4D/1	2/15/88	FID	0	1	0	124136	0	X 1
VMWG4D/1	2/16/88	ECD	0	3	39	2	338	X 1
VMWG4D/1	2/16/88	FID	0	0	0	72967	0	X 1
VMWG4D/1	2/17/88	ECD	0	3	52	2	318	X 1
VMWG4D/1	2/17/88	FID	0	0	0	43707	0	X 1
VMWG4D/1	2/19/88	ECD	0	3	105	2	589	X 1
VMWG4D/1	2/19/88	FID	0	0	0	61089	0	X 1
VMWG4D/1	2/21/88	FID	0	0	0	182151	0	X 1
VMWG4D/1	2/22/88	ECD	1	3	110	2	430	X 1
VMWG4D/1	2/23/88	ECD	0	3	45	2	606	X 1
VMWG4D/1	2/23/88	FID	0	0	0	67044	0	X 1
VMWG4D/1	2/25/88	ECD	0	3	23	2	118	X 1
VMWG4D/1	2/25/88	FID	0	0	0	1	0	X 1
VMWG4D/1	2/29/88	ECD	0	3	44	2	326	X 1
VMWG4D/1	2/29/88	FID	0	0	0	41052	0	X 1
VMWG4D/1	3/02/88	ECD	0	3	35	2	191	X 1
VMWG4D/1	3/02/88	FID	0	0	0	1	0	X 1
VMWG4D/1	3/04/88	ECD	0	3	1	2	460	X 1
VMWG4D/1	3/04/88	FID	0	0	0	40946	0	X 1
VMWG4D/1	3/06/88	ECD	0	3	154	2	682	X 1
VMWG4D/1	3/06/88	FID	0	0	0	78055	0	X 1
VMWG4D/1	3/08/88	ECD	0	3	28	2	107	X 1
VMWG4D/1	3/08/88	FID	0	0	0	44164	0	X 1

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
VMWG4D/1	3/10/88	ECD	0	3	78	2	227	X 1
VMWG4D/1	3/10/88	FID	0	0	0	131779	0	X 1
VMWG4D/1	3/15/88	ECD	0	3	200	2	344	X 1
VMWG4D/1	3/15/88	FID	0	0	0	0	0	X 1
VMWG4D/1	3/18/88	ECD	0	3	0	2	953	X 10
VMWG4D/1	3/18/88	FID	0	0	0	246799	0	X 1
VMWG4D/1	3/20/88	ECD	0	3	0	2	281	X 5
VMWG4D/1	3/20/88	FID	0	0	0	197845	0	X 1
VMWG4D/1	3/22/88	ECD	0	3	1	2	201	X 1
VMWG4D/1	3/22/88	FID	0	0	0	1	0	X 1
VMWG4D/1	3/24/88	ECD	0	3	0	2	444	X 10
VMWG4D/1	3/24/88	FID	0	0	0	0	0	X 1
VMWG4D/1	3/26/88	ECD	0	3	0	2	286	X 5
VMWG4D/1	3/26/88	FID	0	0	0	0	0	X 1
VMWG4D/1	3/28/88	ECD	0	3	26	2	427	X 1
VMWG4D/1	3/28/88	FID	0	0	0	41149	0	X 1
VMWG4D/1	3/30/88	ECD	0	3	619	2	944	X 5
VMWG4D/1	3/30/88	FID	0	0	0	56161	0	X 1
VMWG4D/1	4/01/88	ECD	0	3	0	2	997	X 25
VMWG4D/1	4/01/88	FID	0	0	0	0	0	X 1
VMWG4D/1	4/04/88	ECD	0	3	0	2	243	X 5
VMWG4D/1	4/04/88	FID	0	0	0	1	0	X 1
VMWG4D/1	4/06/88	ECD	0	3	0	2	439	X 10
VMWG4D/1	4/06/88	FID	0	0	0	0	0	X 1
VMWG4D/1	4/08/88	ECD	0	3	1	2	374	X 5
VMWG4D/1	4/08/88	FID	0	0	0	47706	0	X 1
VMWG4D/1	4/10/88	ECD	0	3	0	2	21	X 1
VMWG4D/1	4/10/88	FID	0	0	0	0	0	X 1
VMWG4D/1	4/12/88	FID	0	0	0	0	0	X 1
VMWG4D/1	4/14/88	FID	0	0	0	0	0	X 1
VMWG4D/1	4/22/88	ECD	0	3	4725	2	208	X 1
VMWG4D/1	4/22/88	FID	0	0	0	0	0	X 1

ACTIVE TREATMENT

PROCESS GAS-SEPARATOR INLET (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
PGSEPIN	2/11/88	ECD	0	3	20467	2	5783	X 200
PGSEPIN	2/11/88	FID	0	147594	1	2544176	0	X 1
PGSEPIN	2/13/88	ECD	0	3	9570	2	4131	X 200
PGSEPIN	2/13/88	FID	0	85828	0	1373817	0	X 1
PGSEPIN	2/15/88	ECD	0	3	7016	2	1	X 200
PGSEPIN	2/15/88	FID	0	60103	0	1290362	0	X 1
PGSEPIN	2/17/88	ECD	0	3	6843	2	8576	X 50
PGSEPIN	2/17/88	FID	0	58019	0	1098607	0	X 1
PGSEPIN	2/22/88	ECD	0	3	2292	2	3006	X 50
PGSEPIN	2/22/88	FID	0	37038	0	933929	0	X 1
PGSEPIN	3/01/88	ECD	0	3	7355	2	16691	X 50
PGSEPIN	3/01/88	FID	0	35994	0	1127667	0	X 1
PGSEPIN	3/07/88	FID	0	1	0	1104635	0	X 1
PGSEPIN/1	3/07/88	ECD	0	3	1823	2	4524	X 50
PGSEPIN	3/21/88	ECD	0	3	1195	2	2783	X 25
PGSEPIN	3/21/88	FID	0	1	0	648172	0	X 1
PGSEPIN	3/28/88	ECD	0	3	1708	2	5262	X 10
PGSEPIN	3/28/88	FID	0	1	0	681546	0	X 1
PGSEPIN	4/07/88	FID	0	1	0	578695	0	X 1
PGSEPIN/1	4/07/88	ECD	0	3	1178	2	3101	X 25
PGSEPIN	4/13/88	ECD	0	3	1149	2	3252	X 10
PGSEPIN	4/13/88	FID	0	1	0	511199	0	X 1
PGSEPIN	4/18/88	FID	0	1	0	454720	0	X 1

0 = Below Detection Limit
1 = Below Quantitation Limit (Trace)
2 = Above Quantitation Limit
3 = Not quantified due to matrix interference

ACTIVE TREATMENT

PROCESS GAS-PRIMARY CARBON OUTLET (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
PGCARBOUT	2/11/88	ECD	0	3	0	2	1	X 1
PGCARBOUT	2/11/88	FID	0	0	0	23492	0	X 1
PGCARBOUT	2/12/88	ECD	8580	3	251	2	1	X 1
PGCARBOUT	2/12/88	FID	0	0	0	0	0	X 1
PGCARBOUT	2/13/88	ECD	0	3	0	28	0	X 1
PGCARBOUT/1	2/13/88	FID	0	0	0	0	0	X 1
PGCARBOUT	2/14/88	ECD	0	3	0	2	0	X 1
PGCARBOUT	2/14/88	FID	0	0	0	0	0	X 1
PGCARBOUT	2/15/88	ECD	0	3	0	2	0	X 1
PGCARBOUT	2/15/88	FID	0	0	0	0	0	X 1
PGCARBOUT	2/16/88	ECD	0	3	0	2	0	X 1
PGCARBOUT	2/16/88	FID	0	0	0	0	0	X 1
PGCARBOUT	2/17/88	ECD	0	3	0	22	0	X 1
PGCARBOUT	2/18/88	ECD	0	3	0	0	0	X 1
PGCARBOUT	2/19/88	ECD	0	3	1	2	26	X 1
PGCARBOUT	2/20/88	ECD	1	3	1	14	1	X 1
PGCARBOUT	2/21/88	ECD	0	3	0	2	0	X 1
PGCARBOUT	2/22/88	ECD	0	3	0	42	0	X 1
PGCARBOUT	2/23/88	ECD	1	3	25	2	24	X 1
PGCARBOUT	2/23/88	FID	0	0	0	0	0	X 1
PGCARBOUT/2	2/23/88	ECD	1	3	24	50	0	X 1
PGCARBOUT	2/24/88	ECD	1	3	439	74	0	X 1
PGCARBOUT	2/25/88	ECD	0	3	1431	2	0	X 1
PGCARBOUT	2/25/88	FID	0	48432	0	0	0	X 1
PGCARBOUT	2/26/88	ECD	0	3	1	2	0	X 1
PGCARBOUT	2/26/88	FID	0	0	0	0	0	X 1
PGCARBOUT	2/29/88	ECD	0	3	0	60	0	X 1
PGCARBOUT	3/01/88	ECD	0	3	0	40	0	X 1
PGCARBOUT	3/02/88	ECD	0	3	0	55	0	X 1

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
PGCARBOUT	3/03/88	ECD	0	3	0	26	0	X 1
PGCARBOUT	3/03/88	FID	0	0	0	0	0	X 1
PGCARBOUT	3/04/88	ECD	0	3	0	27	1	X 1
PGCARBOUT	3/05/88	ECD	0	3	0	51	0	X 1
PGCARBOUT	3/05/88	FID	0	0	0	0	0	X 1
PGCARBOUT	3/06/88	ECD	0	3	145	35	0	X 1
PGCARBOUT	3/07/88	ECD	0	3	976	2	0	X 1
PGCARBOUT	3/07/88	FID	0	1	0	0	0	X 1
PGCARBOUT	3/08/88	ECD	0	3	2984	2	0	X 1
PGCARBOUT	3/08/88	FID	0	59097	0	67100	0	X 1
PGCARBOUT	3/09/88	FID	0	60121	0	313772	0	X 1
PGCARBOUT	3/10/88	FID	0	52092	0	545419	0	X 1
PGCARBOUT	3/11/88	ECD	1	3	3166	2	1	X 10
PGCARBOUT	3/11,88	FID	0	47407	0	613342	0	X 1
PGCARBOUT	3/19/88	ECD	0	3	0	7	1	X 1
PGCARBOUT	3/20/88	ECD	0	3	0	0	59	X 1
PGCARBOUT	3/21/88	ECD	0	3	632	2	98	X 1
PGCARBOUT	3/22/88	ECD	0	3	1556	2	126	X 1
PGCARBOUT	3/22/88	FID	0	1	0	95493	0	X 1
PGCARBOUT	3/23/88	ECD	0	3	3339	2	145	X 1
PGCARBOUT	3/23/88	FID	0	54627	0	390215	0	X 1
PGCARBOUT	3/24/88	ECD	0	3	4714	2	494	X 1
PGCARBOUT	3/24/88	FID	0	52177	0	717317	0	X 1
PGCARBOUT/2	3/24/88	ECD	0	3	0	45	1	X 1
PGCARBOUT	3/25/88	ECD	1	3	25	12	1	X 1
PGCARBOUT	3/26/88	ECD	0	3	634	13	1	X 1
PGCARBOUT	3/27/88	ECD	0	3	2085	2	29	X 1
PGCARBOUT	3/27/88	FID	0	61360	0	1	0	X 1
PGCARBOUT	3/28/88	ECD	0	3	2819	2	188	X 5
PGCARBOUT	3/28/88	FID	0	69574	0	113453	0	X 1
PGCARBOUT	3/29/88	ECD	0	3	2930	2	372	X 10
PGCARBOUT	3/29/88	FID	0	65351	0	261832	0	X 1

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
PGCARBOUT	3/30/88	ECD	1	3	0	2	36	X 1
PGCARBOUT	3/30/88	FID	0	1	0	0	0	X 1
PGCARBOUT	3/31/88	ECD	1	3	28	9	28	X 1
PGCARBOUT	3/31/88	FID	0	0	0	0	0	X 1
PGCARBOUT	4/01/88	ECD	1	3	24	76	26	X 1
PGCARBOUT	4/01/88	FID	0	0	0	0	0	X 1
PGCARBOUT	4/02/88	ECD	3412	3	137	14	40	X 1
PGCARBOUT	4/02/88	FID	0	0	0	120538	0	X 1
PGCARBOUT	4/04/88	ECD	0	3	2450	2	469	X 1
PGCARBOUT	4/04/88	FID	0	50440	0	490231	238315	X 1
PGCARBOUT	4/05/88	ECD	1	3	823	2	180	X 1
PGCARBOUT	4/05/88	FID	0	75751	0	1	0	X 1
PGCARBOUT	4/06/88	ECD	1	3	2356	2	45	X 1
PGCARBOUT	4/06/88	FID	0	76502	0	1	0	X 1
PGCARBOUT	4/07/88	ECD	0	3	5057	2	353	X 5
PGCARBOUT	4/07/88	FID	0	82625	0	188205	0	X 1
PGCARBOUT	4/08/88	ECD	0	3	2854	2	1	X 10
PGCARBOUT	4/08/88	FID	0	74295	0	292693	0	X 1
PGCARBOUT	4/09/88	ECD	0	3	5993	2	1	X 25
PGCARBOUT	4/09/88	FID	0	94678	0	606610	0	X 1
PGCARBOUT	4/10/88	ECD	0	3	6199	2	1	X 20
PGCARBOUT	4/10/88	FID	0	51923	0	712281	0	X 1
PGCARBOUT	4/11/88	ECD	0	3	5608	2	219	X 10
PGCARBOUT	4/11/88	FID	0	88708	0	475874	0	X 1
PGCARBOUT	4/12/88	ECD	1	3	3112	2	69	X 1
PGCARBOUT	4/12/88	FID	0	117962	0	33690	0	X 1
PGCARBOUT	4/13/88	ECD	0	3	5379	2	63	X 5
PGCARBOUT	4/13/88	FID	0	107683	0	65488	0	X 1
PGCARBOUT	4/14/88	FID	0	69971	0	197926	0	X 1
PGCARBOUT	4/15/88	FID	0	47407	0	346782	0	X 1

ACTIVE TREATMENT

PROCESS GAS-SECONDARY CARBON OUTLET (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
PGSECOND	2/11/88	ECD	0	3	88	2	72	X 1
PGSECOND	2/11/88	FID	0	0	0	73134	0	X 1
PGSECOND	2/15/88	ECD	0	3	0	12	1	X 1
PGSECOND	2/15/88	FID	0	0	0	0	0	X 1
PGSECOND	2/17/88	ECD	0	3	41	2	259	X 1
PGSECOND	2/17/88	FID	0	0	0	83798	0	X 1
PGSECOND	3/01/88	ECD	0	3	0	58	0	X 1
PGSECOND	3/01/88	FID	0	0	0	0	0	X 1
PGSECOND	3/07/88	ECD	0	3	0	26	1	X 1
PGSECOND	3/07/88	FID	0	0	0	0	0	X 1
PGSECOND	3/08/88	ECD	0	3	0	2	1	X 1
PGSECOND	3/08/88	FID	0	0	0	0	0	X 1
PGSECOND	3/09/88	ECD	0	3	0	11	0	X 1
PGSECOND	3/10/88	ECD	0	3	0	9	0	X 1
PGSECOND	3/11/88	ECD	1	3	0	10	0	X 1
PGSECOND	3/21/88	ECD	0	3	0	14	1	X 1
PGSECOND	3/22/88	ECD	0	3	0	2	1	X 1
PGSECOND	3/22/88	FID	0	0	0	0	0	X 1
PGSECOND/2	3/22/88	FID	0	0	0	0	0	X 1
PGSECOND	3/23/88	ECD	0	3	0	0	27	X 1
PGSECOND	3/23/88	FID	0	0	0	0	0	X 1
PGSECOND	3/24/88	ECD	0	3	0	7	1	X 1
PGSECOND	3/25/88	ECD	0	3	0	0	1	X 1
PGSECOND	3/28/88	ECD	0	3	0	2	1	X 1
PGSECOND	3/29/88	ECD	0	3	0	0	1	X 1
PGSECOND	3/30/88	ECD	0	3	0	6	1	X 1
PGSECOND	4/05/88	ECD	1	3	25	2	26	X 1
PGSECOND	4/05/88	FID	0	0	0	0	0	X 1
PGSECOND	4/07/88	ECD	1	3	474	2	1	X 1
PGSECOND	4/07/88	FID	0	1	0	0	0	X 1

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
PGSECOND	4/09/88	ECD	1	3	2327	2	30	X 1
PGSECOND	4/11/88	ECD	1	3	1560	2	130	X 1
PGSECOND/1	4/11/88	FID	0	51937	0	35942	0	X 1

0 = Below Detection Limit
1 = Below Quantitation Limit (Trace)
2 = Above Quantitation Limit
3 = Not quantified due to matrix interference

ACTIVE TREATMENT

PROCESS GAS-STACK OUTLET (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
PGSTOUT	3/24/88	ECD	0	3	0	64	1	X 1

0 = Below Detection Limit
1 = Below Quantitation Limit (Trace)
2 = Above Quantitation Limit
3 = Not quantified due to matrix interference

ACTIVE TREATMENT

FIELD, FIELD-BIASED & TRIP BLANKS (ug/cubic meter)

Sample ID	Date	Detector Type	Methylene Chloride	Trans 1,2 DCE	TRI	Trichloro ethylene	Tetrachloro ethylene	Dilution
FIELDBLNK	2/15/88	ECD	0	3	0	43	0	x 1
FIELDBLANK	2/20/88	ECD	1	3	30	2	92	x 1
FIELDBLANK	2/20/88	FID	0	0	0	34739	0	x 1
FIELDBLANK	3/01/88	ECD	0	3	0	43	0	x 1
FIELDBLANK	3/08/88	ECD	0	3	0	2	0	x 1
FB	3/21/88	ECD	0	3	0	112	46	x 1
GLAMB	3/24/88	ECD	0	3	0	32	1	x 1
TRIPBLANK	3/25/88	ECD	0	3	0	14	1	x 1
FIELDBLANK	4/06/88	ECD	0	3	0	59	33	x 1
FIELDBLANK	4/06/88	FID	0	0	0	0	0	x 1
FBB/1	4/13/88	ECD	0	3	0	2	22	x 1
FBB/1	4/13/88	FID	0	0	0	0	0	x 1
FBB/1	4/21/88	ECD	0	3	327	2	0	x 1
FBB/1	4/21/88	FID	0	0	0	0	0	x 1
TRIPBLNK	4/22/88	ECD	0	3	0	8	0	x 1

0 = Below Detection Limit
1 = Below Quantitation Limit (Trace)
2 = Above Quantitation Limit
3 = Not quantified due to matrix interference

APPENDIX F

PROCESS PARAMETERS

Process Parameters

Daily readings were obtained at several points along the system and were recorded and used in some of the calculations. The following tables are a compilation of all recorded data for this project. The following should be noted:

- Pbar = Barometric pressure in inches of mercury
- MM4 = Modified Method 4
- All system variables were obtained from the separator inlet.
- Slack tube manometer and Dwyer oil manometers were used to measure vacuums on vacuum monitoring wells.
- % moisture at extraction wells were calculated from the formula:

$$\% \text{ moisture} = \frac{\text{saturated vapor pressure}}{\text{net pressure}}$$

GROVELAND/TERRA-VAC PROGRAM

Day No.		1	2	3	4	5	6	7	8	9
Date		2/11/88	2/12/88	2/13/88	2/14/88	2/15/88	2/16/88	2/17/88	2/18/88	2/19/88
Pbar(in. Hg.)		30.85	30.08	29.36	29.98	30.03	29.75	30.36	30.35	30.49
Temp(F)		36	34	32	26	40	40	32	42	34
SYSTEM VARIABLES										
	Temp(F)	35	35	38	35	38	40	40	41	40
	Vacuum(in. Hg.)	6	5.5	5	4.75	5.5	6	4.5	5	4.5
	% Moisture(MM4)	1.15	1.67	1.9	2.8	3.1	2.5	2.31	2.8	1.44
MONITORING WELLS-VACUUM (in. Water)										
	VMW1S	2.3	2	2.4	2.5	2.5	2.4	2.6	2.6	2.7
	VMW1D	4.5	4.3	5.2	5.4	4.7	5.1	5.4	5	5
	VMW2S	5.6	5.4	5.5	5.4	5.7	4.3	3.8	4.3	3.9
	VMW2D	8.3	8.2	8.9	9.4	8.4	9	9.2	8.7	8.7
	VMW3S	6.5	6.9	7.3	7.4	8	7	7	7.2	7.5
	VMW3D	10	9.8	10	10	10	10	10	10.5	10
	VMW4S	0.8	0.6	0.8	0.7	0.8	0.7	0.8	0.9	0.8
	VMW4D	4	3.6	4.3	4.6	4.1	4.3	4.5	4.2	4.1
EXTRACTION WELLS										
EW1D	Vacuum(in. Hg.)	2.5	1.5	3	3.5	2.5	3	3	3	2.5
	Flow(GPM)	16	34	34	31	40	33	26	29	28
	% Moisture	0.72	0.71	0.87	0.77	0.83	0.93	0.91	0.94	0.89
EW1S	Vacuum(in. Hg.)	5.5	5	5	5	5	5.5	4.5	5	4.5
	Flow(GPM)	8	10	10	9	9	10	8	8	8
	% Moisture	0.8	0.82	0.94	0.81	0.91	1.02	0.96	1.01	0.95
EW2D	Vacuum(in. Hg.)	2.5	2.5	3	2.5	2.5	3	3	2	3
	Flow(GPM)	17	18	22	18	16	19	15	20	19
	% Moisture	0.72	0.74	0.87	0.74	0.83	0.93	0.91	0.9	0.9
EW2S	Vacuum(in. Hg.)	6	5	5	4.5	5	5.5	4.5	5	4.5
	Flow(GPM)	19	15	15	9	18	14	8	10	10
	% Moisture	0.82	0.82	0.94	0.8	0.91	1.02	0.96	1.01	0.95
EW3D	Vacuum(in. Hg.)	2.5	3.5	4	3.5	2	3	3.25	2	3.5
	Flow(GPM)	10	10	6	5	6	8	5	7	5
	% Moisture	0.72	0.77	0.9	0.77	0.81	0.93	0.91	0.9	0.92
EW3S	Vacuum(in. Hg.)	5	5	4.5	4.5	5	5.5	4.5	5	4.5
	Flow(GPM)	9	8	10	8	7	5	4	5	5
	% Moisture	0.79	0.82	0.92	0.8	0.91	1.02	0.96	1.01	0.95
EW4D	Vacuum(in. Hg.)	2	1.5	1.5	3.5	2.5	3.5	2	3.5	3.5
	Flow(GPM)	8	10	7	7	16	8	9	8	6
	% Moisture	0.8	0.71	0.81	0.77	0.83	0.94	0.87	0.96	0.92
EW4S	Vacuum(in. Hg.)	5	5	4.5	4.5	5	5.5	4.5	4.5	4.5
	Flow(GPM)	7	8	10	8	8	7	7	7	7
	% Moisture	0.79	0.82	0.92	0.8	0.91	1.02	0.96	0.99	0.95

GROVELAND/TERRA-VAC PROGRAM

Day No.		10	11	12	13	14	15	16	17	18
Date		2/20/88	2/21/88	2/22/88	2/23/88	2/24/88	2/25/88	2/26/88	2/29/88	3/1/88
Pbar(in. Hg.)		29.54	29.78	30.29	29.92	30.15	30.25	30.38	30.17	30.35
Temp(F)		42	28	27	50	35	30	30	54	39
SYSTEM VARIABLES										
Temp(F)		40	40	36	43	40	38	40	40	40
Vacuum(in. Hg.)		4.5	4	4.5	5	4.5	4.5	5	5	5
% Moisture(MM4)		1.4	0.77	0.72	1.6	1.3	0.98	1.3	1.6	1.04
MONITORING WELLS-VACUUM (in. Water)										
VMW1S		3.4	3	3.2	3.2	2.8	3.1	3.6	3.8	4
VMW1D		5.2	5.4	5	4.4	4.8	5.5	5.2	4.4	4.1
VMW2S		4.3	3.1	5.1	4.9	4.8	4.7	6.3	6.5	7.3
VMW2D		8.7	10	8.9	7.7	8.7	9.8	9.3	7.9	7
VMW3S		8.3	8	8.9	9.1	8.7	8.3	10.2	9.2	10
VMW3D		10.5	10	10.5	9.3	10.1	10.5	10.1	10	8.1
VMW4S		1	0.9	0.9	1	0.7	0.8	0.8	0.9	1.1
VMW4D		4.2	4.6	4.2	3.6	3.9	4.4	4	3.6	3.3
EXTRACTION WELLS										
EW1D	Vacuum(in. Hg.)	2.5	2.5	3.5	2.5	2.5	2.5	2	3	3
	Flow(GPM)	29	28	26	26	25	26	30	27	28
	% Moisture	0.92	0.91	0.79	1	0.89	0.82	0.87	0.91	0.9
EW1S	Vacuum(in. Hg.)	4.5	3.5	5	4.5	4	3.5	4.5	4.5	4.5
	Flow(GPM)	8	8	9	9	9	9	12	10	12
	% Moisture	0.99	0.94	0.84	1.09	0.94	0.85	0.95	0.97	0.96
EW2D	Vacuum(in. Hg.)	2.5	2.5	3.25	3.5	2.7	2.5	2.5	3.5	3
	Flow(GPM)	16	15	15	18	20	16	16	16	14
	% Moisture	0.94	0.91	0.78	1.05	0.9	0.82	0.88	0.93	0.9
EW2S	Vacuum(in. Hg.)	4.5	4	4.5	4.5	4	4	4.5	4.5	4.5
	Flow(GPM)	8	12	12	10	9	9	12	16	16
	% Moisture	0.99	0.96	0.82	1.09	0.94	0.87	0.95	0.97	0.96
EW3D	Vacuum(in. Hg.)	2.5	2.5	3.5	2.5	3	3	3	2	4.5
	Flow(GPM)	6	6	5	8	6	5	5	9	6
	% Moisture	0.92	0.91	0.79	1.01	0.91	0.84	0.9	0.88	0.96
EW3S	Vacuum(in. Hg.)	4.5	4	4	4.5	4	4	4.5	4.5	4.5
	Flow(GPM)	4	5	6	5.5	6	6	6	10	8
	% Moisture	0.99	0.96	0.8	1.09	0.94	0.87	0.95	0.97	0.96
EW4D	Vacuum(in. Hg.)	2	2.5	3.5	3	3	3	2.5	4	3.5
	Flow(GPM)	6	6	5	6	5.5	5	5	5	4
	% Moisture	0.9	0.91	0.79	1.03	0.91	0.84	0.88	0.95	0.92
EW4S	Vacuum(in. Hg.)	4.5	4	4	4.75	4	4	4.5	4.5	4.5
	Flow(GPM)	6	8	7	7	7	7	8	12	9
	% Moisture	0.99	0.96	0.8	1.11	0.94	0.87	0.95	0.97	0.96

GROVELAND/TERRA-VAC PROGRAM

Day No.		19	20	21	22	23	24	25	26	27
Date		3/2/88	3/3/88	3/4/88	3/5/88	3/6/88	3/7/88	3/8/88	3/9/88	3/10/88
Pbar(in. Hg.)		30.38	30.29	30.24	30.38	30.48	30.12	30.66	30.25	29.64
Temp(F)		27	52	33	32	48	46	48	53	48
SYSTEM VARIABLES										
	Temp(F)	35	42	35	36	40	40	40	40	40
	Vacuum(in. Hg.)	5.5	5.5	6	5.5	5.5	5	5.5	5.5	5.5
	% Moisture(MM4)	1.3	0.87	1.3	1.04	1	1.2	0.7	1.2	1.3
MONITORING WELLS-VACUUM (in. Water)										
	VMW1S	4	4.3	4.6	4.4	4.2	4.3	4.1	3.9	4.1
	VMW1D	4.2	4.1	4	4.4	4.6	4.7	5.2	4.8	5.1
	VMW2S	7.1	7.8	8	7.9	7.5	7.6	7.2	7.4	7.3
	VMW2D	7.4	7.3	6.9	7.6	8.5	8.8	9.7	9.4	9.5
	VMW3S	10	10	10	10	10	10	10	10	10
	VMW3D	8.5	8.1	7.8	8.5	9.2	9.3	8.8	9.4	9.9
	VMW4S	1	1.2	1.2	1.2	1.2	1.3	1.1	1.1	1.2
	VMW4D	3.5	3.3	3.1	3.4	3.6	3.7	4.1	3.7	4.1
EXTRACTION WELLS										
EW1D	Vacuum(in. Hg.)	3	2.5	2	2.5	2.5	3	2.5	2.5	3
	Flow(GPM)	28	23	27	29	31	28	28	30	32
	% Moisture	0.74	0.96	0.72	0.76	0.89	0.91	0.88	0.89	0.93
EW1S	Vacuum(in. Hg.)	3.5	4.5	5	5	5	5	5	4.5	5
	Flow(GPM)	13	12	16	13	13	12	14	12	9
	% Moisture	0.82	1.04	0.81	0.83	0.97	0.98	0.97	0.96	1.01
EW2D	Vacuum(in. Hg.)	3.5	2.5	3	3	2.5	3	2.5	2.5	3
	Flow(GPM)	13	16	14	20	21	18	20	21	23
	% Moisture	0.75	0.96	0.75	0.77	0.89	0.91	0.88	0.89	0.93
EW2S	Vacuum(in. Hg.)	5.5	5	5	5	5	5	5	5	5
	Flow(GPM)	11	20	18	16	16	16	18	16	15
	% Moisture	0.82	1.06	0.81	0.83	0.97	0.98	0.97	0.98	1.01
EW3D	Vacuum(in. Hg.)	4	2	3	4	2.5	3	4.2	2	4
	Flow(GPM)	4	5	5	4	6	5	4	6	5
	% Moisture	0.74	0.95	0.75	0.8	0.89	0.91	0.94	0.87	0.97
EW3S	Vacuum(in. Hg.)	5.5	5	5	5	5	5	5	5	5
	Flow(GPM)	8	8	10	10	9	8	8	7	6
	% Moisture	0.82	1.06	0.81	0.83	0.97	0.98	0.97	0.98	1.01
EW4D	Vacuum(in. Hg.)	1	5	5	3.5	3	2.5	2.5	5	4
	Flow(GPM)	4	0	1	0	0	0	0	0	0
	% Moisture	0.69	1.06	0.81	0.79	0.9	0.89	0.88	0.98	0.97
EW4S	Vacuum(in. Hg.)	5.5	5	5	5	5	5	5	5	5
	Flow(GPM)	9	10	11	10	10	10	10	9	7
	% Moisture	0.82	1.06	0.81	0.83	0.97	0.98	0.97	0.98	1.01

GROVELAND/TERRA-VAC PROGRAM

Day No.		28	29	30	31	32	33	34	35	36
Date		3/11/88	3/18/88	3/19/88	3/20/88	3/21/88	3/22/88	3/23/88	3/24/88	3/25/88
Pbar(in. Hg.)		30.02	30.2	29.85	29.8	30.4	30.62	30.88	30.24	30.68
Temp(F)		45	46	60	40	16	29	42	68	46
SYSTEM VARIABLES										
	Temp(F)	40	40	42	35	35	38	40	45	40
	Vacuum(in. Hg.)	5	3.5	4.5	5	4.5	5	5	5	5
	% Moisture(MM4)	1.3	1.3	0.97	0.91	1.3	0.99	1.8	1.5	1.22
MONITORING WELLS-VACUUM (in. Water)										
	VMW1S	3.4	3.4	3.1	3	3.4	3.4	3.4	3.4	3.5
	VMW1D	5.3	5	5	5.3	5.2	5.3	5.2	5.4	4.9
	VMW2S	4.7	5.9	5.2	5.1	5.9	5.9	5.9	5.6	5.8
	VMW2D	9.5	9.3	9.5	10	9.7	9.8	10	10.2	9.5
	VMW3S	10	10.5	9.5	8.8	9.8	10.2	9.9	10	10.5
	VMW3D	10	10.1	9.4	9.8	9.7	9.9	9.7	10	9.6
	VMW4S	0.7	1.1	0.9	1	0.9	1.1	1.1	1.1	1.1
	VMW4D	4.2	4.2	4.1	4.2	4.2	4.2	4.2	4.1	3.9
EXTRACTION WELLS										
EW1D	Vacuum(in. Hg.)	3	2	3	2.5	2.5	3	2.5	2.5	2.5
	Flow(GPM)	26	26	36	28	29	21	30	30	26
	% Moisture	1.1	0.88	1	0.91	0.73	0.83	0.87	1.07	0.88
EW1S	Vacuum(in. Hg.)	4.5	3.5	4	4	4	4.5	5	4.5	5
	Flow(GPM)	11	10	10	11	12	12	15	12	11
	% Moisture	1.2	0.93	1	0.96	0.77	0.89	0.96	1.15	0.96
EW2D	Vacuum(in. Hg.)	2.5	2	2.5	2.5	2.5	2.5	3	3	2.5
	Flow(GPM)	21	18	22	27	26	24	22	20	24
	% Moisture	1.09	0.88	0.97	0.91	0.73	0.82	0.89	1.09	0.88
EW2S	Vacuum(in. Hg.)	4.5	3.5	4.5	4	4	4.5	5	4.5	4.5
	Flow(GPM)	16	14	14	16	15	16	17	15	16
	% Moisture	1.18	0.93	1	0.96	0.77	0.89	0.96	1.15	0.95
EW3D	Vacuum(in. Hg.)	3	2	1.5	3.5	3	2.5	3.5	2.5	2
	Flow(GPM)	4	8	8	7	5	7	5	6	6
	% Moisture	1.11	0.88	0.94	0.94	0.74	0.82	0.91	1.07	0.86
EW3S	Vacuum(in. Hg.)	4.5	3.5	4.5	4	4	4.5	5	4.5	4.5
	Flow(GPM)	8	7	7	6	8	8	8	8	7
	% Moisture	1.18	0.93	1	0.96	0.77	0.89	0.96	1.15	0.95
EW4D	Vacuum(in. Hg.)	2	3	1.5	3.5	2.5	4	2.5	2.5	4.5
	Flow(GPM)	0	1	0	0	0	0	0	0	0
	% Moisture	1.07	0.91	0.94	0.94	0.73	0.86	0.87	0.87	
EW4S	Vacuum(in. Hg.)	4.5	3.5	4.5	4	4.5	4.5	5	4.5	4.5
	Flow(GPM)	10	8	9	10	10	10	10	10	10
	% Moisture	1.18	0.93	1	0.96	0.79	0.89	0.96	1.15	0.95

GROVELAND/TERRA-VAC PROGRAM

Day No.		37	38	39	40	41	42	43	44	46
Date		3/26/88	3/27/88	3/28/88	3/29/88	3/30/88	3/31/88	4/1/88	4/2/88	4/4/88
Pbar(in. Hg.)		30.35	29.93	30.38	30.54	30.71	30.64	30.67	30.6	30.14
Temp(F)		66	62	42	62	52	56	58	67	62
SYSTEM VARIABLES										
Temp(F)		45	45	40	45	45	45	43	45	45
Vacuum(in. Hg.)		4.5	6	5.5	5.5	5.5	5.5	5.5	6	3
% Moisture(MM4)		1.9	1.47	1.22	0.64	1.53	1.07	1.4	0.97	*
MONITORING WELLS-VACUUM (in. Water)										
VMW1S		3.2	3.5	3.6	3.8	3.3	3.4	3.3	1.5	2
VMW1D		6	5.6	5.1	5.2	5	4.7	5.2	3.7	3.8
VMW2S		4.7	7.3	6.6	6.6	6.1	6.5	6.2	4.1	3.9
VMW2D		10	10	10	9.6	9.3	8.6	9.8	7.2	7.3
VMW3S		9.2	10	10	10	10	10	10.1	10	7.1
VMW3D		10	10	9.9	10	9.6	9	9.6	9.3	7.5
VMW4S		1.2	1.1	1	1.1	0.7	1	1	0.6	0.5
VMW4D		4.7	4.5	4.1	4.2	3.9	3.9	4.2	2.8	3
EXTRACTION WELLS										
EW1D	Vacuum(in. Hg.)	3	2	2.5	2.5	3	3	2.5	2.5	2
	Flow(GPM)	29	26	25	25	28	28	31	22	20
	% Moisture	1.1	1.12	0.88	1.07	1.08	1.09	1	1.06	1.07
EW1S	Vacuum(in. Hg.)	4	5	5	5	5	5	5	5	3
	Flow(GPM)	13	11	12	12	13	13	13	13	8
	% Moisture	1.1	1.2	0.97	1.18	1.17	1.17	1.1	1.17	1.11
EW2D	Vacuum(in. Hg.)	3	3	3	3	3	3	3	3	2
	Flow(GPM)	20	22	20	18	20	19	19	21	15
	% Moisture	1.1	1.12	0.9	1.09	1.08	1.09	1	1.09	1.07
EW2S	Vacuum(in. Hg.)	4	5	5	5	5	5.5	5	5	3
	Flow(GPM)	12	14	14	14	15	15	16	16	9
	% Moisture	1.1	1.2	0.97	1.18	1.17	1.19	1.1	1.17	1.11
EW3D	Vacuum(in. Hg.)	3	2.5	3	3	1.5	4.5	3.5	4	3
	Flow(GPM)	5	7	6	5	6	5	4	2	4
	% Moisture	1.1	1.1	0.9	1.09	1.03	1.15	1	1.12	1.11
EW3S	Vacuum(in. Hg.)	4	5.5	5	5	5	5.5	5	5	3
	Flow(GPM)	8	6	7	8	8	8	8	6	5
	% Moisture	2.2	1.23	0.97	1.18	1.17	1.19	1.1	1.17	1.11
EW4D	Vacuum(in. Hg.)	1	5	4.5	2.5	5	5	5	5	3
	Flow(GPM)	0	0	0	0	0	0	0	0	0
	% Moisture	1		0.95	1.07	1.17	1.17	1.1	1.17	1.11
EW4S	Vacuum(in. Hg.)	4	5.5	5	5	5	5.5	5	5	3
	Flow(GPM)	11	8	8	8	10	9	9	10	6
	% Moisture	1.1	1.23	0.97	1.18	1.17	1.19	1.1	1.17	1.11

GROVELAND/TERRA-VAC PROGRAM

Day No.		47	48	49	50	51	52	53	54	55
Date		4/5/88	4/6/88	4/7/88	4/8/88	4/9/88	4/10/88	4/11/88	4/12/88	4/13/88
Pbar(in. Hg.)		30.07	30.32	30.08	30.02	30	30.3	30.2	30.45	30.38
Temp(F)		62	44	44	43	54	60	42	43	44
SYSTEM VARIABLES										
	Temp(F)	45	40	40	40	42	42	40	40	40
	Vacuum(in. Hg.)	4.5	4	4.5	4.5	4.5	4.5	4.5	4.5	5
	% Moisture(MM4)	1.42	1.05	1.09	1.5	1.53	1.2	1.33	1.1	1.25
MONITORING WELLS-VACUUM (in. Water)										
	VMW1S	3.3	2	2	2.2	1.9	2	2	2	1.5
	VMW1D	4.4	6	6.6	6.5	6.7	6.5	6.7	6.8	7
	VMW2S	6.6	4	3.7	3.9	3.8	3.6	3.8	3.7	3.2
	VMW2D	8.7	12.7	12.5	12.5	12.7	12.5	12.5	13.1	13.5
	VMW3S	10	7.2	6.9	7.5	7.1	7.5	7.1	7.2	6.9
	VMW3D	8.7	12	11.5	12	12	12	11.8	12.5	13
	VMW4S	1.1	0.6	0.5	0.6	0.7	0.5	0.7	0.6	0.6
	VMW4D	3.8	5.3	5.3	5.2	5.4	5.1	5.3	5.4	5.8
EXTRACTION WELLS										
EW1D	Vacuum(in. Hg.)	3	3.5	4	3.5	4	3.5	3.5	3.5	3.5
	Flow(GPM)	28	28	30	30	29	28	28	29	32
	% Moisture	1.11	0.92	0.95	0.93	1.02	1	0.93	0.9	0.92
EW1S	Vacuum(in. Hg.)	4	2.5	2.5	3	2.5	2.5	3	2	2
	Flow(GPM)	16	9	10	9	12	11	10	8	9
	% Moisture	1.15	0.89	0.9	0.92	0.97	0.96	0.91	0.9	0.87
EW2D	Vacuum(in. Hg.)	3.5	3.5	4	4	4	3.5	4	4	4
	Flow(GPM)	18	26	26	24	24	24	25	27	28
	% Moisture	1.13	0.92	0.95	0.95	1.02	1	0.94	0.9	0.94
EW2S	Vacuum(in. Hg.)	4	2	3	3	2.5	3	3	2.5	2
	Flow(GPM)	14	12	10	12	10	11	11	8	12
	% Moisture	1.15	0.87	0.92	0.92	0.97	0.98	0.91	0.9	0.87
EW3D	Vacuum(in. Hg.)	4	3.5	4	4	4.5	4	4	4	4
	Flow(GPM)	2	4	4	5	4	5	4	4	4
	% Moisture	1.15	0.92	0.95	0.95	1.04	1	0.94	0.9	0.94
EW3S	Vacuum(in. Hg.)	4	2.5	3	2.5	3.5	3	3	3	2.5
	Flow(GPM)	8	6	6	65	6	6	5	4	5
	% Moisture	1.15	0.89	0.92	0.9	1.1	0.98	0.91	0.9	0.89
EW4D	Vacuum(in. Hg.)	4	3.5	4	4	4.5	4	4	4	4
	Flow(GPM)	0		0	0	8	0	0	0	0
	% Moisture	1.15	0.92	0.95	0.95	1.04	1.02	0.94	0.9	0.94
EW4S	Vacuum(in. Hg.)	4	2	3	3	3	2.5	3	3	4
	Flow(GPM)	10	8	10	8	8	8	8	8	8
	% Moisture	1.15	0.87	0.92	0.92	0.99	0.96	0.91	0.9	0.94

GROVELAND/TERRA-VAC PROGRAM

Day No.		56	57	60
Date		4/14/88	4/15/88	4/18/88
Pbar(in. Hg.)		30.42	30.35	29.7
Temp(F)		48	47	48
SYSTEM VARIABLES				
Temp(F)		40	40	40
Vacuum(in. Hg.)		4	4.5	4.75
% Moisture(MM4)		1.24	0.99	1.32
MONITORING WELLS-VACUUM (in. Water)				
VMW1S		1.7	1.9	2.2
VMW1D		7	6.8	6.9
VMW2S		3.3	3.7	3.6
VMW2D		13.5	13	13
VMW3S		6.5	7.5	7.9
VMW3D		23	12.5	12.5
VMW4S		0.7	0.7	0.8
VMW4D		5.7	5.5	5.5
EXTRACTION WELLS				
EW1D	Vacuum(in. Hg.)	4	4	4
	Flow(GPM)	30	30	30
	% Moisture	0.93	0.94	0.96
EW1S	Vacuum(in. Hg.)	2.5	3	3.5
	Flow(GPM)	10	10	9
	% Moisture	0.88	0.9	0.95
EW2D	Vacuum(in. Hg.)	4	3.5	4
	Flow(GPM)	25	23	27
	% Moisture	0.93	0.92	0.96
EW2S	Vacuum(in. Hg.)	2	2.5	2.5
	Flow(GPM)	10	10	12
	% Moisture	0.87	0.89	0.91
EW3D	Vacuum(in. Hg.)	4.5	4	4
	Flow(GPM)	4	4	4
	% Moisture	0.95	0.94	0.96
EW3S	Vacuum(in. Hg.)	2	3	3
	Flow(GPM)	5	5	5
	% Moisture	0.87	0.9	0.93
EW4D	Vacuum(in. Hg.)	4.5	4	4
	Flow(GPM)	0	0	0
	% Moisture	0.95	0.94	0.96
EW4S	Vacuum(in. Hg.)	3	2.5	3
	Flow(GPM)	8	8	8
	% Moisture	0.9	0.89	0.93

APPENDIX G

FLOW RATES AND FLUX RATES

Flow Rates and Flux Rates

The following tables contain the flow rates and flux rates as determined from the process parameter, analytical results, and the following formula:

Flow Rates

$$\text{SCFM} = \text{GPM} \times 4.12 \times \sqrt{\times \frac{(14.7\text{-vacuum @pt})}{14.7} \times \frac{530}{460 + \text{temp. @ pt.}}}$$

where:
SCFM = standard cubic feet per minute.
GPM = gallon per minute (read directly from rotometer)
@pt = readings of vacuum and temperature at specified sampling points

Flux Rates

$$\text{lbs/hr} = \text{Flow } (F^3/\text{min}) \times 0.02832\ (m^3/F3) + [\text{concentrations @pt. } (ug/m^3) \div 4.54 \times 10^8 (ug/lb)] \times 60 \text{ min/hr}$$

FLOW RATES AND FLUX RATES, EW1S

FIRST WEEK OF SAMPLING-COLLECTION TWICE PER DAY

SAMPLE CODE	DATE	FLOW SCFM	MeCl** Lbs/hr	DCE Lbs/hr	TRI ** Lbs/hr	TCE Lbs/hr	PCE ** Lbs/hr	TOTAL FID(a) Lbs/DAY	TOTAL ECD(a) Lbs/DAY
EWG1S/1	2/11/88	27	0.000	0.016	0.002	0.299	0.001	5.574	0.037
EWG1S/2	2/11/88	27	0.000	0.009	0.001	0.141	0.000		
EWG1S/1	2/12/88	35	0.000	0.007	0.000	0.139	0.001	2.938	0.018
EWG1S/2	2/12/88	35	0.000	0.005	0.001	0.094	0.000		
EWG1S/1	2/13/88	35	0.000	0.006	0.001	0.103	0.000	2.506	0.012
EWG1S/2	2/13/88	35	0.000	0.005	0.000	0.096	0.000		
EWG1S/1	2/14/88	31	0.000	0.000	0.000	0.084	0.000	1.824	0.009
EWG1S/2	2/14/88	31	0.000	0.000	0.000	0.068	0.000		
EWG1S/1	2/15/88	31	0.000	0.000	0.000	0.076	0.000	1.663	0.003
EWG1S/2	2/15/88	31	0.000	0.000	0.000	0.063	0.000		
EWG1S/1	2/16/88	34	0.000	0.000	0.000	0.092	0.000	1.978	0.011
EWG1S/2	2/16/88	34	0.000	0.000	0.000	0.073	0.000		
EWG1S/1	2/17/88	28	0.000	0.000	0.000	0.060	0.000	1.368	0.007
EWG1S/2	2/17/88	28	0.000	0.000	0.000	0.054	0.000		

TOTAL Lbs FID VOC 17.851

TOTAL Lbs ECD VOC 0.097

** RESULTS OF MeCl, TRI ,&PCE ARE FROM ECD ANALYSIS:DCE&TCE RESULTS ARE FROM FID ANALYSIS

(a) Average of two samples collected during the day.

SECOND THROUGH EIGTH WEEK-COLLECTION ONCE PER DAY

SAMPLE CODE	DATE	FLOW SCFM	MeCl** Lbs/hr	DCE Lbs/hr	TRI ** Lbs/hr	TCE Lbs/hr	PCE ** Lbs/hr	TOTAL FID Lbs/DAY	TOTAL ECD Lbs/DAY
EWG1S/1	2/18/88	28	0.000	0.000	0.000	0.052	0.000	1.257	0.006
	2/19/88	28	0.000	0.000	0.000	0.053	0.000	1.269	0.009
	2/20/88	28	0.000	0.000	0.000	0.037	0.000	0.889	0.004
	2/21/88	30	0.000	0.000	0.000	0.048	0.000	1.156	0.004
	2/22/88	31	0.000	0.000	0.000	0.037	0.000	0.878	0.001
	2/23/88	32	0.000	0.000	0.000	0.040	0.000	0.954	0.012
	2/24/88	33	0.000	0.000	0.000	0.056	0.000	1.355	0.006
	2/25/88	33	0.000	0.000	0.000	0.039	0.000	0.927	0.000
	2/26/88	42	0.000	0.000	0.000	0.044	0.000	1.058	0.012
	2/29/88	35	0.000	0.000	0.000	0.046	0.001	1.113	0.023
	3/01/88	42	0.000	0.000	0.000	0.041	0.001	0.993	0.024
	3/02/88	44	0.000	0.000	0.000	0.038	0.001	0.916	0.015
	3/03/88	42	0.000	0.000	0.000	0.027	0.000	0.654	0.004
	3/04/88	55	0.000	0.000	0.000	0.044	0.000	1.067	0.004
	3/05/88	45	0.000	0.000	0.000	0.040	0.000	0.966	0.004
	3/06/88	45	0.004	0.000	0.000	0.037	0.000	0.884	0.093
	3/07/88	41	0.000	0.000	0.000	0.018	0.000	0.439	0.009
	3/08/88	48	0.000	0.000	0.000	0.025	0.000	0.590	0.010
	3/09/88	42	0.000	0.000	0.000	0.052	0.000	1.255	0.012
	3/10/88	31	0.000	0.000	0.000	0.015	0.000	0.369	0.007
	3/11/88	39	0.000	0.000	0.000	0.019	0.000	0.465	0.011

** RESULTS OF MeCl, TRI ,&PCE ARE FROM ECD ANALYSIS:DCE&TCE RESULTS ARE FROM FID ANALYSIS

SAMPLE CODE	DATE	FLOW SCFM	MeCl** Lbs/hr	DCE Lbs/hr	TRI ** Lbs/hr	TCE Lbs/hr	PCE ** Lbs/hr	TOTAL FID Lbs/DAY	TOTAL ECD Lbs/DAY
EWG1S/1	3/18/88	37	0.000	0.000	0.000	0.042	0.001	1.018	0.024
	3/19/88	36	0.000	0.000	0.000	0.029	0.001	0.687	0.017
	3/20/88	40	0.000	0.000	0.000	0.077	0.000	1.856	0.013
	3/21/88	44	0.000	0.000	0.000	0.032	0.000	0.758	0.000
	3/22/88	43	0.000	0.000	0.000	0.019	0.000	0.466	0.010
	3/23/88	52	0.000	0.000	0.000	0.388	0.000	9.315	0.014
	3/24/88	42	0.000	0.000	0.000	0.018	0.000	0.425	0.002
	3/25/88	38	0.000	0.000	0.000	0.022	0.000	0.534	0.010
	3/26/88	47	0.000	0.000	0.000	0.019	0.000	0.447	0.010
	3/27/88	38	0.000	0.000	0.000	0.020	0.000	0.478	0.010
	3/28/88	41	0.000	0.000	0.000	0.016	0.000	0.377	0.008
	3/29/88	41	0.000	0.000	0.000	0.014	0.000	0.343	0.001
	3/30/88	45	0.000	0.000	0.000	0.018	0.000	0.437	0.008
	3/31/88	45	0.000	0.000	0.000	0.018	0.000	0.437	0.009
	4/01/88	45	0.000	0.000	0.000	0.014	0.000	0.342	0.008
	4/02/88	45	0.000	0.000	0.000	0.011	0.000	0.274	0.007
	4/04/88	30	0.000	0.000	0.000	0.007	0.000	0.178	0.003
	4/05/88	58	0.000	0.000	0.000	0.015	0.000	0.362	0.008
	4/06/88	35	0.000	0.000	0.000	0.009	0.000	0.209	0.003
	4/07/88	39	0.000	0.000	0.000	0.009	0.000	0.211	0.001
	4/08/88	34	0.000	0.000	0.000	0.009	0.000	0.222	0.003
	4/09/88	46	0.000	0.000	0.000	0.009	0.000	0.225	0.003
	4/10/88	42	0.000	0.000	0.000	0.008	0.000	0.202	0.004
	4/11/88	38	0.000	0.000	0.000	0.007	0.000	0.160	0.003

** RESULTS OF MeCl, TRI ,&PCE ARE FROM ECD ANALYSIS:DCE&TCE RESULTS ARE FROM FID ANALYSIS

SAMPLE CODE	DATE	FLOW SCFM	MeCl** Lbs/hr	DCE Lbs/hr	TRI ** Lbs/hr	TCE Lbs/hr	PCE ** Lbs/hr	TOTAL FID Lbs/DAY	TOTAL ECD Lbs/DAY
EWG1S/1	4/12/88	32	0.000	0.000	0.000	0.007	0.000	0.160	0.002
	4/13/88	36	0.000	0.000	0.000	0.010	0.000	0.248	0.003
	4/14/88	39	0.000	0.000	0.000	0.006	0.000	0.149	0.000
	4/15/88	38	0.000	0.000	0.000	0.007	0.000	0.169	0.000
	4/18/88	33	0.000	0.000	0.000	0.005	0.000	0.131	0.000

TOTAL Lbs FID VOC 40.272

TOTAL Lbs ECD VOC 0.453

** RESULTS OF MeCl, TRI ,&PCE ARE FROM ECD ANALYSIS:DCE&TCE RESULTS ARE FROM FID ANALYSIS

FLOW RATES AND FLUX RATES, EW 1D

FIRST WEEK OF SAMPLING-COLLECTION TWICE PER DAY

SAMPLE CODE	DATE	FLOW SCFM	MeCl** Lbs/hr	DCE Lbs/hr	TRI ** Lbs/hr	TCE Lbs/hr	PCE ** Lbs/hr	TOTAL FID(a) Lbs/DAY	TOTAL ECD (a) Lbs/DAY
EWG1D/1	2/11/88	62	0.000	0.021	0.003	0.292	0.000	5.737	0.041
EWG1D/2	2/11/88	62	0.000	0.014	0.000	0.148	0.000		
EWG1D/1	2/12/88	137	0.000	0.038	0.002	0.226	0.000	5.544	0.037
EWG1D/2	2/12/88	132	0.000	0.027	0.002	0.171	0.000		
EWG1D/1	2/13/88	129	0.000	0.018	0.000	0.127	0.000	2.981	0.000
EWG1D/2	2/13/88	129	0.000	0.000	0.000	0.104	0.000		
EWG1D/1	2/14/88	115	0.000	0.000	0.000	0.068	0.000	1.874	0.000
EWG1D/2	2/14/88	120	0.000	0.000	0.000	0.088	0.000		
EWG1D/1	2/15/88	155	0.000	0.000	0.000	0.400	0.000	6.699	0.018
EWG1D/2	2/15/88	155	0.000	0.000	0.000	0.158	0.001		
EWG1D/1	2/16/88	125	0.000	0.000	0.000	0.063	0.000	1.680	0.000
EWG1D/2	2/16/88	128	0.000	0.000	0.000	0.077	0.000		
EWG1D/1	2/17/88	98	0.000	0.000	0.000	0.046	0.000	1.198	0.000
EWG1D/2	2/17/88	100	0.000	0.000	0.000	0.054	0.000		

TOTAL Lbs FID VOC 25.713

TOTAL Lbs ECD VOC 0.096

** RESULTS OF MeCl, TRI ,&PCE ARE FROM ECD ANALYSIS:DCE&TCE RESULTS ARE FROM FID ANALYSIS

(a) Average of two samples collected during the day.

SECOND THROUGH EIGTH WEEK-COLLECTION ONCE PER DAY

SAMPLE CODE	DATE	FLOW SCFM	MeCl** Lbs/hr	DCE Lbs/hr	TRI ** Lbs/hr	TCE Lbs/hr	PCE ** Lbs/hr	TOTAL FID Lbs/DAY	TOTAL ECD Lbs/DAY
EWG1D/1	2/18/88	110	0.000	0.000	0.000	0.048	0.000	1.152	0.013
	2/19/88	108	0.000	0.000	0.000	0.039	0.000	0.932	0.000
	2/20/88	112	0.000	0.000	0.000	0.041	0.000	0.973	0.000
	2/21/88	108	0.000	0.000	0.000	0.038	0.000	0.903	0.011
	2/22/88	97	0.000	0.000	0.000	0.031	0.000	0.755	0.009
	2/23/88	100	0.000	0.000	0.000	0.036	0.000	0.860	0.011
	2/24/88	97	0.000	0.000	0.000	0.095	0.000	2.276	0.000
	2/25/88	101	0.000	0.000	0.000	0.081	0.000	1.955	0.005
	2/26/88	118	0.000	0.000	0.000	0.036	0.000	0.863	0.007
	2/29/88	102	0.000	0.000	0.001	0.055	0.000	1.328	0.036
	3/01/88	106	0.000	0.000	0.000	0.048	0.000	1.154	0.017
	3/02/88	106	0.000	0.000	0.000	0.044	0.001	1.051	0.022
	3/03/88	89	0.000	0.000	0.000	0.033	0.000	0.794	0.003
	3/04/88	107	0.000	0.000	0.000	0.067	0.000	1.610	0.011
	3/05/88	113	0.000	0.000	0.000	0.054	0.000	1.285	0.000
	3/06/88	120	0.000	0.000	0.000	0.046	0.001	1.106	0.020
	3/07/88	106	0.000	0.000	0.000	0.044	0.000	1.052	0.006
	3/08/88	108	0.000	0.000	0.000	0.089	0.001	2.128	0.022
	3/09/88	116	0.000	0.000	0.000	1.158	0.000	27.794	0.014
	3/10/88	121	0.000	0.000	0.000	0.043	0.000	1.028	0.014
	3/11/88	98	0.000	0.000	0.000	0.032	0.000	0.775	0.011

** RESULTS OF MeCl, TRI ,&PCE ARE FROM ECD ANALYSIS:DCE&TCE RESULTS ARE FROM FID ANALYSIS

SAMPLE CODE	DATE	FLOW SCFM	MeCl** Lbs/hr	DCE Lbs/hr	TRI ** Lbs/hr	TCE Lbs/hr	PCE ** Lbs/hr	TOTAL FID Lbs/DAY	TOTAL ECD Lbs/DAY
EWG1D/1	3/18/88	103	0.000	0.029	0.004	0.428	0.001	10.972	0.120
	3/19/88	136	0.000	0.000	0.000	0.072	0.001	1.737	0.023
	3/20/88	109	0.000	0.000	0.000	0.039	0.001	0.942	0.018
	3/21/88	113	0.000	0.000	0.000	0.030	0.000	0.710	0.011
	3/22/88	80	0.000	0.000	0.000	0.020	0.000	0.485	0.008
	3/23/88	116	0.000	0.000	0.000	0.020	0.000	0.479	0.011
	3/24/88	115	0.000	0.000	0.000	0.025	0.000	0.601	0.009
	3/25/88	101	0.000	0.000	0.000	0.019	0.000	0.465	0.009
	3/26/88	109	0.000	0.000	0.000	0.030	0.000	0.713	0.009
	3/27/88	98	0.000	0.000	0.000	0.017	0.000	0.400	0.009
	3/28/88	97	0.000	0.000	0.000	0.012	0.000	0.277	0.006
	3/29/88	96	0.000	0.000	0.000	0.024	0.000	0.582	0.008
	3/30/88	105	0.000	0.000	0.000	0.029	0.000	0.689	0.010
	3/31/88	105	0.000	0.000	0.000	0.029	0.000	0.698	0.012
	4/01/88	119	0.000	0.000	0.000	0.040	0.000	0.959	0.015
	4/02/88	85	0.000	0.000	0.000	0.021	0.000	0.503	0.006
	4/04/88	78	0.000	0.000	0.000	0.021	0.000	0.499	0.007
	4/05/88	105	0.000	0.000	0.000	0.027	0.000	0.641	0.018
	4/06/88	104	0.000	0.000	0.000	0.023	0.000	0.552	0.008
	4/07/88	109	0.000	0.000	0.000	0.018	0.000	0.437	0.008
	4/08/88	111	0.000	0.000	0.000	0.019	0.000	0.456	0.006
	4/09/88	105	0.000	0.000	0.000	0.017	0.000	0.399	0.004
	4/10/88	103	0.000	0.000	0.000	0.014	0.000	0.333	0.005
	4/11/88	104	0.000	0.000	0.000	0.017	0.000	0.401	0.005

** RESULTS OF MeCl, TRI ,&PCE ARE FROM ECD ANALYSIS:DCE&TCE RESULTS ARE FROM FID ANALYSIS

SAMPLE CODE	DATE	FLOW SCFM	MeCl** Lbs/hr	DCE Lbs/hr	TRI ** Lbs/hr	TCE Lbs/hr	PCE ** Lbs/hr	TOTAL FID Lbs/DAY	TOTAL ECD Lbs/DAY
EWG10/1	4/12/88	107	0.000	0.000	0.001	0.013	0.000	0.306	0.025
	4/13/88	119	0.000	0.000	0.000	0.014	0.000	0.341	0.006
	4/14/88	109	0.000	0.000	0.000	0.013	0.000	0.318	0.000
	4/15/88	109	0.000	0.000	0.000	0.016	0.000	0.395	0.000
	4/18/88	109	0.000	0.000	0.000	0.000	0.000	0.000	0.000

TOTAL Lbs FID VOC 78.065

TOTAL Lbs ECD VOC 0.611

** RESULTS OF MeCl, TRI ,&PCE ARE FROM ECD ANALYSIS:DCE&TCE RESULTS ARE FROM FID ANALYSIS

FLOW RATES AND FLUX RATES, EW2S

SAMPLE CODE	DATE	FLOW SCFM	MeCl** Lbs/hr	DCE Lbs/hr	TRI ** Lbs/hr	TCE Lbs/hr	PCE ** Lbs/hr	TOTAL FID Lbs/DAY	TOTAL ECD Lbs/DAY
EWG2S/1	2/11/88	62	0.000	0.014	0.001	0.297	0.000	7.465	0.031
	2/12/88	52	0.000	0.007	0.000	0.134	0.001	3.395	0.025
	2/13/88	52	0.000	0.008	0.000	0.157	0.000	3.950	0.000
	2/14/88	32	0.000	0.000	0.000	0.074	0.000	1.786	0.000
	2/15/88	62	0.000	0.000	0.001	0.159	0.000	3.811	0.020
	2/16/88	47	0.000	0.006	0.000	0.154	0.000	3.849	0.014
	2/17/88	28	0.000	0.000	0.000	0.130	0.000	3.124	0.007
	2/18/88	34	0.000	0.000	0.000	0.085	0.000	2.028	0.008
	2/20/88	28	0.000	0.000	0.000	0.048	0.000	1.141	0.007
	2/22/88	43	0.000	0.000	0.000	0.020	0.000	0.480	0.000
	2/24/88	33	0.000	0.006	0.000	0.013	0.000	0.466	0.007
	2/26/88	42	0.000	0.000	0.000	0.051	0.000	1.227	0.002
	3/01/88	57	0.000	0.000	0.000	0.018	0.000	0.440	0.006
	3/03/88	69	0.000	0.000	0.000	0.051	0.000	1.232	0.003
	3/05/88	55	0.000	0.000	0.000	0.048	0.000	1.140	0.000
	3/07/88	55	0.000	0.000	0.000	0.037	0.000	0.885	0.012
	3/09/88	55	0.000	0.000	0.000	0.099	0.000	2.379	0.012
	3/11/88	57	0.000	0.000	0.000	0.067	0.001	1.603	0.026
	3/18/88	52	0.000	0.000	0.000	0.077	0.001	1.839	0.030
	3/19/88	49	0.000	0.000	0.000	0.043	0.001	1.033	0.018
	3/21/88	55	0.000	0.000	0.000	0.046	0.000	1.104	0.012
	3/23/88	59	0.000	0.000	0.000	0.041	0.001	0.972	0.014

** RESULTS OF MeCl, TRI ,&PCE ARE FROM ECD ANALYSIS:DCE&TCE RESULTS ARE FROM FID ANALYSIS

SAMPLE CODE	DATE	FLOW SCFM	MeCl** Lbs/hr	DCE Lbs/hr	TRI ** Lbs/hr	TCE Lbs/hr	PCE ** Lbs/hr	TOTAL FID Lbs/DAY	TOTAL ECD Lbs/DAY
EWG2S/1	3/25/88	57	0.000	0.000	0.000	0.043	0.001	1.037	0.015
	3/27/88	48	0.000	0.000	0.000	0.007	0.000	0.175	0.003
	3/29/88	48	0.000	0.000	0.000	0.026	0.000	0.615	0.010
	3/31/88	50	0.000	0.000	0.000	0.029	0.000	0.690	0.006
	4/02/88	55	0.000	0.000	0.000	0.035	0.000	0.849	0.006
	4/05/88	50	0.000	0.000	0.000	0.025	0.000	0.597	0.008
	4/07/88	38	0.000	0.000	0.000	0.015	0.000	0.369	0.001
	4/09/88	39	0.000	0.000	0.000	0.016	0.000	0.392	0.004
	4/11/88	42	0.000	0.000	0.000	0.017	0.000	0.409	0.004
	4/13/88	47	0.000	0.000	0.000	0.018	0.000	0.439	0.005
	4/15/88	39	0.000	0.000	0.000	0.018	0.000	0.431	0.000
	4/18/88	46	0.000	0.000	0.000	0.020	0.000	0.486	0.000

TOTAL Lbs FID VOC 51.841

TOTAL Lbs ECD VOC 0.315

** RESULTS OF MeCl, TRI ,&PCE ARE FROM ECD ANALYSIS:DCE&TCE RESULTS ARE FROM FID ANALYSIS

FLOW RATES AND FLUX RATES, EW2D

SAMPLE CODE	DATE	FLOW SCFM	MeCl** Lbs/hr	DCE Lbs/hr	TRI ** Lbs/hr	TCE Lbs/hr	PCE ** Lbs/hr	TOTAL FID Lbs/DAY	TOTAL ECD Lbs/DAY
EWG2D/1	2/11/88	66	0.000	0.025	0.002	0.315	0.001	8.156	0.076
	2/12/88	70	0.000	0.011	0.000	0.105	0.001	2.787	0.022
	2/13/88	83	0.000	0.033	0.000	0.129	0.001	3.877	0.023
	2/14/88	70	0.000	0.023	0.000	0.090	0.001	2.712	0.018
	2/15/88	62	0.000	0.021	0.000	0.172	0.001	4.623	0.032
	2/16/88	72	0.000	0.016	0.000	0.046	0.000	1.499	0.010
	2/17/88	57	0.000	0.016	0.000	0.045	0.000	1.461	0.009
	2/18/88	79	0.000	0.020	0.000	0.054	0.001	1.778	0.015
	2/20/88	62	0.000	0.014	0.000	0.370	0.000	9.204	0.002
	2/22/88	56	0.000	0.011	0.000	0.021	0.000	0.773	0.002
	2/24/88	77	0.000	0.011	0.000	0.025	0.000	0.868	0.014
	2/26/88	62	0.000	0.012	0.000	0.022	0.000	0.817	0.010
	3/01/88	53	0.000	0.011	0.000	0.027	0.001	0.899	0.018
	3/03/88	62	0.000	0.011	0.000	0.024	0.000	0.834	0.011
	3/05/88	76	0.000	0.015	0.000	0.033	0.000	1.146	0.000
	3/07/88	68	0.000	0.014	0.000	0.126	0.000	3.351	0.000
	3/09/88	81	0.000	0.016	0.000	0.057	0.001	1.754	0.026
	3/11/88	81	0.000	0.015	0.000	0.134	0.001	3.569	0.039
	3/18/88	71	0.000	0.015	0.000	0.048	0.001	1.509	0.027
	3/19/88	85	0.000	0.017	0.000	0.034	0.001	1.220	0.019
	3/21/88	101	0.000	0.018	0.000	0.034	0.000	1.238	0.013
	3/23/88	83	0.000	0.014	0.000	0.038	0.001	1.265	0.016

** RESULTS OF MeCl, TRI ,&PCE ARE FROM ECD ANALYSIS:DCE&TCE RESULTS ARE FROM FID ANALYSIS

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SAMPLE CODE	DATE	FLOW SCFM	MeCl** Lbs/hr	DCE Lbs/hr	TRI ** Lbs/hr	TCE Lbs/hr	PCE ** Lbs/hr	TOTAL FID Lbs/DAY	TOTAL ECD Lbs/DAY
EWG2D/1	3/25/88	93	0.000	0.000	0.000	0.026	0.000	0.626	0.013
	3/27/88	83	0.000	0.014	0.000	0.042	0.001	1.351	0.018
	3/29/88	68	0.000	0.000	0.000	0.021	0.000	0.501	0.009
	3/31/88	72	0.000	0.000	0.000	0.019	0.000	0.462	0.006
	4/02/88	79	0.000	0.000	0.000	0.027	0.000	0.637	0.008
	4/05/88	66	0.000	0.011	0.000	0.029	0.000	0.970	0.010
	4/07/88	94	0.000	0.015	0.000	0.030	0.000	1.087	0.009
	4/09/88	87	0.000	0.014	0.000	0.029	0.000	1.040	0.006
	4/11/88	91	0.000	0.000	0.000	0.029	0.000	0.696	0.005
	4/13/88	101	0.000	0.000	0.000	0.147	0.000	3.520	0.005
	4/15/88	85	0.000	0.000	0.000	0.026	0.000	0.616	0.000
	4/18/88	98	0.000	0.000	0.000	0.022	0.000	0.532	0.000

TOTAL Lbs FID VOC 67.377

TOTAL Lbs ECD VOC 0.494

** RESULTS OF MeCl, TRI ,&PCE ARE FROM ECD ANALYSIS:DCE&TCE RESULTS ARE FROM FID ANALYSIS

FLOW RATES AND FLUX RATES, EW3S

SAMPLE CODE	DATE	FLOW SCFM	MeCl** Lbs/hr	DCE Lbs/hr	TRI ** Lbs/hr	TCE Lbs/hr	PCE ** Lbs/hr	TOTAL FID Lbs/DAY	TOTAL ECD Lbs/DAY
EWG3S/1	2/11/88	31	0.000	0.024	0.007	0.849	0.001	20.946	0.190
	2/12/88	28	0.000	0.016	0.005	0.621	0.001	15.303	0.150
	2/13/88	35	0.000	0.016	0.005	0.647	0.003	15.911	0.197
	2/14/88	28	0.000	0.010	0.003	0.439	0.001	10.784	0.082
	2/15/88	24	0.000	0.009	0.002	0.418	0.001	10.263	0.075
	2/16/88	17	0.000	0.006	0.001	0.270	0.001	6.606	0.029
	2/17/88	14	0.000	0.000	0.000	0.045	0.000	1.082	0.007
	2/18/88	17	0.000	0.000	0.000	0.074	0.000	1.770	0.012
	2/20/88	14	0.000	0.000	0.000	0.060	0.000	1.435	0.006
	2/22/88	22	0.000	0.004	0.001	0.220	0.001	5.388	0.032
	2/24/88	22	0.000	0.003	0.000	0.194	0.001	4.747	0.029
	2/26/88	21	0.000	0.003	0.000	0.183	0.000	4.466	0.009
	3/01/88	28	0.000	0.004	0.000	0.269	0.001	6.568	0.033
	3/03/88	27	0.000	0.004	0.000	0.206	0.001	5.043	0.040
	3/05/88	35	0.000	0.005	0.000	0.260	0.001	6.377	0.023
	3/07/88	28	0.000	0.000	0.000	0.134	0.001	3.228	0.022
	3/09/88	24	0.000	0.004	0.000	0.183	0.001	4.494	0.034
	3/11/88	28	0.000	0.000	0.000	0.120	0.001	2.884	0.021
	3/18/88	26	0.000	0.005	0.000	0.256	0.002	6.284	0.059
	3/19/88	25	0.000	0.000	0.000	0.162	0.002	3.883	0.045
	3/21/88	29	0.000	0.000	0.000	0.131	0.001	3.145	0.028
	3/23/88	28	0.000	0.000	0.000	0.131	0.001	3.146	0.033

** RESULTS OF MeCl, TRI ,&PCE ARE FROM ECD ANALYSIS:DCE&TCE RESULTS ARE FROM FID ANALYSIS

SAMPLE CODE	DATE	FLOW SCFM	MeCl** Lbs/hr	DCE Lbs/hr	TRI ** Lbs/hr	TCE Lbs/hr	PCE ** Lbs/hr	TOTAL FID Lbs/DAY	TOTAL ECD Lbs/DAY
EWG3S/1	3/25/88	25	0.000	0.000	0.000	0.108	0.001	2.601	0.025
	3/27/88	20	0.000	0.000	0.000	0.145	0.002	3.476	0.042
	3/29/88	27	0.000	0.000	0.000	0.179	0.002	4.287	0.054
	3/31/88	27	0.000	0.000	0.000	0.123	0.001	2.942	0.027
	4/02/88	21	0.000	0.000	0.000	0.083	0.001	1.991	0.014
	4/05/88	29	0.000	0.000	0.000	0.157	0.001	3.758	0.038
	4/07/88	23	0.000	0.000	0.000	0.074	0.001	1.783	0.018
	4/09/88	22	0.000	0.000	0.000	0.097	0.001	2.326	0.014
	4/11/88	19	0.000	0.000	0.000	0.034	0.000	0.805	0.005
	4/13/88	19	0.000	0.000	0.000	0.027	0.000	0.655	0.011
	4/15/88	19	0.000	0.000	0.000	0.043	0.000	1.031	0.000
	4/18/88	19	0.000	0.000	0.000	0.034	0.000	0.812	0.000

TOTAL Lbs FID VOC 170.222

TOTAL Lbs ECD VOC 1.404

** RESULTS OF MeCl, TRI ,&PCE ARE FROM ECD ANALYSIS:DCE&TCE RESULTS ARE FROM FID ANALYSIS

FLOW RATES AND FLUX RATES, EW3D

SAMPLE CODE	DATE	FLOW SCFM	MeCl** Lbs/hr	DCE Lbs/hr	TRI ** Lbs/hr	TCE Lbs/hr	PCE ** Lbs/hr	TOTAL FID Lbs/DAY	TOTAL ECD Lbs/DAY
EWG3D/1	2/11/88	39	0.000	0.038	0.006	0.493	0.001	12.744	0.173
	2/12/88	37	0.000	0.036	0.003	0.268	0.002	7.302	0.104
	2/13/88	22	0.000	0.028	0.003	0.171	0.001	4.773	0.082
	2/14/88	19	0.000	0.018	0.001	0.149	0.001	3.996	0.058
	2/15/88	24	0.000	0.016	0.002	0.159	0.001	4.191	0.082
	2/16/88	30	0.000	0.016	0.001	0.172	0.002	4.510	0.060
	2/17/88	19	0.000	0.008	0.001	0.092	0.001	2.409	0.035
	2/18/88	28	0.000	0.010	0.000	0.108	0.001	2.822	0.031
	2/20/88	23	0.000	0.006	0.006	0.057	0.000	1.513	0.145
	2/22/88	19	0.000	0.004	0.000	0.032	0.000	0.863	0.010
	2/24/88	23	0.000	0.004	0.000	0.048	0.000	1.233	0.007
	2/26/88	19	0.000	0.003	0.000	0.023	0.000	0.623	0.007
	3/01/88	21	0.000	0.004	0.000	0.015	0.000	0.458	0.017
	3/03/88	20	0.000	0.005	0.000	0.036	0.001	0.988	0.030
	3/05/88	15	0.000	0.005	0.000	0.025	0.000	0.734	0.004
	3/07/88	19	0.000	0.003	0.000	0.032	0.000	0.849	0.009
	3/09/88	24	0.000	0.006	0.000	0.063	0.001	1.647	0.022
	3/11/88	15	0.000	0.003	0.000	0.060	0.000	1.518	0.011
	3/18/88	32	0.000	0.009	0.002	0.106	0.000	2.760	0.038
	3/19/88	32	0.000	0.007	0.000	0.059	0.001	1.596	0.030
	3/21/88	19	0.000	0.004	0.000	0.045	0.000	1.175	0.014
	3/23/88	19	0.000	0.003	0.000	0.039	0.000	1.014	0.006

** RESULTS OF MeCl, TRI ,&PCE ARE FROM ECD ANALYSIS:DCE&TCE RESULTS ARE FROM FID ANALYSIS

SAMPLE CODE	DATE	FLOW SCFM	MeCl** Lbs/hr	DCE Lbs/hr	TRI ** Lbs/hr	TCE Lbs/hr	PCE ** Lbs/hr	TOTAL FID Lbs/DAY	TOTAL ECD Lbs/DAY
EWG3D/1	3/25/88	24	0.000	0.000	0.001	0.035	0.001	0.846	0.047
	3/27/88	27	0.000	0.005	0.000	0.058	0.001	1.516	0.026
	3/29/88	19	0.000	0.003	0.000	0.037	0.001	0.959	0.015
	3/31/88	18	0.000	0.000	0.000	0.024	0.000	0.575	0.011
	4/02/88	7	0.000	0.001	0.000	0.012	0.000	0.313	0.004
	4/05/88	7	0.000	0.001	0.000	0.013	0.000	0.354	0.005
	4/07/88	14	0.000	0.003	0.000	0.025	0.000	0.664	0.009
	4/09/88	14	0.000	0.003	0.000	0.023	0.000	0.616	0.008
	4/11/88	14	0.000	0.002	0.000	0.023	0.000	0.610	0.007
	4/13/88	14	0.000	0.000	0.000	0.017	0.000	0.412	0.002
	4/15/88	14	0.000	0.000	0.000	0.019	0.000	0.460	0.000
	4/18/88	14	0.000	0.000	0.000	0.018	0.000	0.435	0.000

TOTAL Lbs FID VOC 67.476

TOTAL Lbs ECD VOC 1.105

** RESULTS OF MeCl, TRI ,&PCE ARE FROM ECD ANALYSIS:DCE&TCE RESULTS ARE FROM FID ANALYSIS

FLOW RATES AND FLUX RATES, EW4S

SAMPLE CODE	DATE	FLOW SCFM	MeCl** Lbs/hr	DCE Lbs/hr	TRI ** Lbs/hr	TCE Lbs/hr	PCE ** Lbs/hr	TOTAL FID Lbs/DAY	TOTAL ECD Lbs/DAY
EWG4S/1	2/11/88	24	0.000	0.045	0.005	0.999	0.002	25.073	0.175
	2/12/88	28	0.000	0.034	0.005	0.929	0.002	23.114	0.171
	2/13/88	35	0.000	0.032	0.006	0.979	0.002	24.272	0.179
	2/14/88	28	0.000	0.031	0.006	1.198	0.004	29.507	0.221
	2/15/88	28	0.000	0.025	0.005	0.941	0.003	23.194	0.186
	2/16/88	23	0.000	0.022	0.002	0.842	0.001	20.736	0.090
	2/17/88	25	0.000	0.026	0.003	0.932	0.002	22.995	0.120
	2/18/88	25	0.000	0.026	0.003	0.932	0.003	22.985	0.140
	2/20/88	21	0.000	0.021	0.002	0.821	0.003	20.199	0.123
	2/22/88	25	0.000	0.018	0.002	0.797	0.002	19.563	0.111
	2/24/88	25	0.000	0.018	0.002	0.866	0.003	21.218	0.135
	2/26/88	28	0.000	0.017	0.001	0.785	0.002	19.256	0.073
	3/01/88	32	0.000	0.023	0.003	1.091	0.000	26.727	0.078
	3/03/88	34	0.000	0.015	0.004	0.729	0.008	17.865	0.273
	3/05/88	35	0.000	0.023	0.001	1.079	0.001	26.467	0.066
	3/07/88	34	0.000	0.019	0.001	0.862	0.002	21.146	0.083
	3/09/88	31	0.000	0.022	0.002	0.905	0.003	22.232	0.111
	3/11/88	35	0.000	0.023	0.002	0.993	0.003	24.396	0.126
	3/18/88	30	0.000	0.029	0.002	1.120	0.005	27.585	0.183
	3/19/88	32	0.000	0.027	0.002	1.017	0.006	25.056	0.196
	3/21/88	35	0.000	0.022	0.002	0.784	0.003	19.358	0.102
	3/23/88	34	0.000	0.022	0.001	0.847	0.004	20.846	0.137

** RESULTS OF MeCl, TRI ,&PCE ARE FROM ECD ANALYSIS:DCE&TCE RESULTS ARE FROM FID ANALYSIS

SAMPLE CODE	DATE	FLOW SCFM	MeCl** Lbs/hr	DCE Lbs/hr	TRI ** Lbs/hr	TCE Lbs/hr	PCE ** Lbs/hr	TOTAL FID Lbs/DAY	TOTAL ECD Lbs/DAY
EWG4S/1	3/25/88	35	0.000	0.021	0.002	0.872	0.005	21.451	0.168
	3/27/88	27	0.000	0.019	0.002	0.779	0.005	19.136	0.167
	3/29/88	27	0.000	0.017	0.001	0.745	0.004	18.289	0.115
	3/31/88	30	0.000	0.012	0.001	0.670	0.003	16.372	0.106
	4/02/88	34	0.000	0.014	0.001	0.735	0.003	17.981	0.085
	4/05/88	36	0.000	0.019	0.002	0.820	0.004	20.123	0.144
	4/07/88	38	0.000	0.019	0.002	0.839	0.004	20.595	0.125
	4/09/88	30	0.000	0.015	0.001	0.601	0.003	14.779	0.093
	4/11/88	30	0.000	0.013	0.001	0.519	0.002	12.765	0.067
	4/13/88	29	0.000	0.010	0.001	0.376	0.001	9.274	0.062
	4/15/88	31	0.000	0.015	0.000	0.568	0.000	13.999	0.000
	4/18/88	30	0.000	0.015	0.000	0.580	0.000	14.275	0.000

TOTAL Lbs FID VOC 702.830

TOTAL Lbs ECD VOC 4.214

** RESULTS OF MeCl, TRI ,&PCE ARE FROM ECD ANALYSIS:DCE&TCE RESULTS ARE FROM FID ANALYSIS

FLOW RATES AND FLUX RATES, EW4D

SAMPLE CODE	DATE	FLOW SCFM	MeCl** Lbs/hr	DCE Lbs/hr	TRI ** Lbs/hr	TCE Lbs/hr	PCE ** Lbs/hr	TOTAL FID Lbs/DAY	TOTAL ECD Lbs/DAY
EWG4D/1	2/11/88	32	0.000	0.036	0.004	0.228	0.001	6.339	0.131
	2/12/88	40	0.000	0.066	0.008	0.457	0.003	12.555	0.256
	2/13/88	28	0.000	0.030	0.005	0.274	0.001	7.286	0.153
	2/14/88	26	0.000	0.023	0.004	0.300	0.003	7.753	0.157
	2/15/88	23	0.000	0.011	0.001	0.142	0.001	3.663	0.056
	2/16/88	30	0.000	0.018	0.002	0.244	0.002	6.268	0.088
	2/17/88	35	0.000	0.018	0.002	0.244	0.003	6.287	0.101
	2/18/88	30	0.000	0.013	0.001	0.163	0.001	4.212	0.061
	2/20/88	24	0.000	0.008	0.001	0.107	0.002	2.771	0.058
	2/22/88	19	0.000	0.003	0.000	0.040	0.000	1.021	0.010
	2/24/88	21	0.000	0.005	0.000	0.172	0.001	4.252	0.036
	2/26/88	19	0.000	0.004	0.000	0.046	0.001	1.207	0.019
	3/01/88	15	0.000	0.005	0.000	0.042	0.000	1.114	0.010
	3/03/88	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3/05/88	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3/07/88	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3/09/88	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3/11/88	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3/18/88	4	0.000	0.001	0.000	0.012	0.000	0.319	0.009
	3/19/88	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3/21/88	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3/23/88	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000

** RESULTS OF MeCl, TRI ,&PCE ARE FROM ECD ANALYSIS:DCE&TCE RESULTS ARE FROM FID ANALYSIS

SAMPLE CODE	DATE	FLOW SCFM	MeCl** Lbs/hr	DCE Lbs/hr	TRI ** Lbs/hr	TCE Lbs/hr	PCE ** Lbs/hr	TOTAL FID Lbs/DAY	TOTAL ECD Lbs/DAY
EWGAD/1	3/25/88	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3/27/88	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3/29/88	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3/31/88	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	4/02/88	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	4/05/88	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	4/07/88	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	4/09/88	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	4/11/88	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	4/13/88	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	4/15/88	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	4/18/88	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000

TOTAL Lbs FID VOC 65.047

TOTAL Lbs ECD VOC 1.142

** RESULTS OF MeCl, TRI ,&PCE ARE FROM ECD ANALYSIS:DCE&TCE RESULTS ARE FROM FID ANALYSIS

APPENDIX H

PROCESS AND SOIL GAS ANALYTICAL SOP's

ALLIANCE TECHNOLOGIES CORPORATION

ON-SITE ANALYTICAL SCHEME FOR PROCESS AND SOIL GAS

Terra Vac Inc. Site Demonstration Project

The attached SOPs for the on-site GC/FID and GC/ECD analysis of process and soil gas are to be used throughout this project. Deviations from these protocols must be approved by the Alliance Laboratory Analysis Coordinator, Joanna Hall, prior to use.

- With the exception of samples known to contain low concentrations (e.g. outlet to the carbon cannisters, ambient background, blanks, etc.), all samples are to be analyzed using GC/FID.

- All FID chromatograms will be evaluated to determine whether the five compounds of interest are within the limits of quantitation. If all components are quantifiable, no ECD analysis is required. If methylene chloride(MC) and trans 1,2-dichloroethylene (DCE) are not detected and 1,1,1-trichloroethane(TRI), trichloroethylene(TCE) and tetrachloroethylene(PCE) are quantifiable, then no further analysis is required. Whenever GC/ECD analysis is required, the sample is diluted into a Tedlar bag to generate a maximum concentration of 25 ng/ml of TCE.

ALLIANCE TECHNOLOGIES CORPORATION

STANDARD OPERATING PROCEDURE

Analysis of Volatile Organic Compounds in Soil Gas and Extracted Process Air using GC/FID

1.0 Scope and Application

This method is intended for use in the analysis of soil gas or extracted air, collected in Tedlar bags or in glass and Teflon gas-tight syringes, for chlorinated volatile organics. The following sections present procedural information detailing this analysis. Appended to this document are the results of a validation study conducted on the following components:

Methylene chloride (MC)
trans 1,2-Dichloroethylene (DCE)
1,1,1-Trichloroethane (TRI)
Trichloroethylene (TCE)
Tetrachloroethylene (PCE)

Application of this method to any other chlorinated volatile organic must be verified before use.

2.0 Apparatus and Materials

- Perkin Elmer 3920 gas chromatograph equipped with a flame ionization detector (GC/FID), heated gas sampling valve and 1 ml gas sampling loop.
- HP 3392 integrator (or equivalent)
- Glass column (6 ft by 2 mm ID) packed with 1% SP 1000 on 60/80 mesh Carbopack B
- Glass 500 ml gas sampling bulbs
- Tedlar bags with Teflon septa and stainless steel valves
- 100 ml gas flow metering bulb
- Assorted glass gas-tight syringes - 1.0 ml, 5.0 ml, 250 ul
- Assorted liquid syringes - 10 ul, 100 ul

3.0 Calibration Standard Preparation

3.1 Stock Standards

Prepare the following in a 5 ml vial with Teflon-lined screw cap:

Stock A		Concentration (mg/ul)	
MC	250 ul	MC	0.265
DCE	250 ul	DCE	0.251
TRI	250 ul	TRI	0.268
TCE	250 ul	TCE	0.293
PCE	250 ul	PCE	0.324

All reference standards must be Chem Service 97% active (or equivalent). Corrections for percent activity must be applied when lot is below 98% active.

Cross contamination must be minimized by carefully rinsing syringes with organic-free water and baking at a minimum temperature of 50 degrees C for 30 minutes before use.

Stock standards are to be stored in glass vials with a minimum of headspace. Vials must be refrigerated at 4 degrees when not in use. Stocks must be prepared at a 60 day frequency, or sooner, if degradation is noted.

3.2 Calibration Gas Standard Preparation

A minumum of three calibration standards are prepared by dilution of the Stock A into 1 l Tedlar bags filled with 1000 ml of UHP nitrogen. Once prepared, bags are maintained, protected from light, for a period not to exceed 48 hours. After expiration, new bags must be generated. The following are the bag standards to be used:

- 1.0 ul of Stock A into 1000 ml nitrogen
- 2.0 ul of Stock A into 1000 ml nitrogen
- 5.0 ul of Stock A into 1000 ml nitrogen
- 10 ul of Stock A into 1000 ml nitrogen
- 20 ul of Stock A into 1000 ml nitrogen
- 50 ul of Stock A into 1000 ml nitrogen

Generation of these dilutions will result in the following concentrations:

Component	Concentration (ug/ml) 1 ul	2 ul	5 ul	10 ul	20 ul	50 ul
MC	0.26	0.53	1.3	2.6	5.3	13
TDE	0.25	0.50	1.3	2.6	5.0	13
TRI	0.27	0.54	1.3	2.7	5.4	13
TCE	0.29	0.59	1.5	2.9	5.9	15
PCE	0.32	0.65	1.6	3.2	6.5	16

4.0 Instrument Calibration

Initial calibration is accomplished by the injection of three calibration standards from the calibration range listed above. Injections are performed by piercing the septum of the Tedlar bag with the needle of a pre-cleaned 50-ml gas-tight syringe and withdrawing approximataely 20 ml. The syringe needle is then pushed through the septum of the gas sampling valve, and the plunger depressed to flush the loop with 5 to 10 ml of gas. The valve is then changed to the on-column position to inject the gas onto the gas chromatograph. Chromatographic conditions are listed below:

Injection temp.	125 degrees C
Valve temp.	100 degrees C
Column temp.	50 to 180 degrees at 8 deg/min
FID temp.	250 degrees C
Carrier flow	30 ml/min. helium
Run time	30 min.

Calibration curves are generated by plotting area counts versus concentration via a linear regression analysis. Acceptance of initial calibration is based on achievement of a correlation coefficient of 0.99 or above.

Daily calibration is accomplished by verifying a single mid-range point of the calibrataion curve. Acceptance of continuing calibration is achievement of 20 per cent difference with the initial curve. Recalibration is required if the continuing calibration check is unacceptable.

Typical retention times for the components studied under the above conditions are:

MC	5.6 min.
DCE	11.5 min.
TRI	14.4 min.
TCE	17.8 min.
PCE	24.7 min.

5.0 Analysis of Samples

Sample analysis is initiated as soon as possible after collection. Samples are analyzed by injecting filled syringes into the gas sampling valve in the same manner used for standards. Component identification is accomplished by matching retention times of peaks in sample injections to those of components in calibration standards. A 3% window for identification is applied. Quantitation of identified components is achieved via linear regression analysis of the area count response .

Sample concentrations must be bracketed by standards. If a sample exceeds the calibrated range additional standards must be injected. If the sample response exceeds the linear range of the detector or integrator, the sample must be diluted. Dilution is performed by injecting a minumum of 10 ml from the syringe into a Tedlar bag filled with a known volume of UHP nitrogen.

Minimum detection limits for this analysis are the following:

MC	0.03 ug/ml
DCE	0.02 ug/ml
TRI	0.02 ug/ml
TCE	0.02 ug/ml
PCE	0.03 ug/ml

Upper and lower quantitation limits are provided below:

	Upper limit	Lower limit
MC	13 ug/ml	0.1 ug/ml
DCE	13 ug/ml	0.1 ug/ml
TRI	13 ug/ml	0.1 ug/ml
TCE	15 ug/ml	0.1 ug/ml
PCE	16 ug/ml	0.1 ug/ml

6.0 Quality Control

Quality control requirements for this analysis include the following:

- Method blanks -- one injection per day of a blank bag or syringe filled with UHP nitrogen.

- Duplicate analysis -- duplicate injection of one in every five samples with a maximum of two per 24 hour period.

- Laboratory Control Samples (LCS) -- analysis of one LCS per 20 program samples. An LCS consists of a injection of an independently prepared bag standard, containing the five components of interest. Suggested for use is the following:

Stock B		Concentration (mg/ul)
MC	250 ul	0.603
DCE	100 ul	0.228
TRI	50 ul	0.122
TCE	100 ul	0.266
PCE	50 ul	0.148

LCS Bag
(5.0 ul Stock B /1000ml)

Concentration (ug/ml)	
MC	3.0
DCE	1.1
TRI	0.61
TCE	1.3
PCE	0.74

Recoveries for the five compounds in the LCS must be in the range of 65 to 130 percent for acceptable performance.

APPENDIX

ALLIANCE TECHNOLOGIES CORPORATION

Validation of Soil Gas and Extracted Process Air Analysis by GC/ECD

A method validation was performed in support of the GC/ECD analysis procedure to be utilized for the Terra Vac Inc. SITE demonstration project at Groveland, MA. The purpose of the validation was to generate precision and accuracy goals for sample analysis using this technique.

Standards in tedlar bags were prepared in triplicate at three concentration levels for the five components of interest; methylene chloride (MC), trans 1,2-dichloroethylene (DCE), 1,1,1-trichloroethane (TRI), trichloroethylene (TCE) and tetrachloroethylene (PCE). All bags were spiked with a standard mixture independently prepared from the standards used to calibrate the instrument for analysis. Gas from each bag was injected onto a 1 ml heated gas sampling loop using a 50 ml gas-tight syringe. Response data was collected from the GC/ECD analysis and concentrations calculated using a linear regression analysis derived from a five-point calibration curve. Results are presented below:

Compoment	Concentration (ng/ml)	Percent Recovery		
		Bag 1	Bag 2	Bag 3
MC	380	101	98	97
DCE	270	101	101	97
TRI	6.1	91	111	120
TCE	0.11	100	100	100
PCE	0.50	100	100	138
MC	75	121	106	110
DCE	53	113	108	116
TRI	1.2	100	85	92
TCE	0.022	119	104	111
PCE	0.099	158	100	100
MC	38	93	90	103
DCE	27	98	92	99
TRI	0.61	83	83	80
TCE	0.011	109	117	109
PCE	0.050	175	160	192

Review of the above results indicates that recoveries are between 80 and 120 percent recovery for all compounds except PCE. The problem with PCE is a result of its elution on the leading edge of a baseline drift at the end of the temperature-programmed analysis. The integrator has difficulty recognizing the start and end of the peak, especially at low concentrations. Clearly, PCE is not quantifiable at the 0.050 ng/ml level, although it is repeatedly detectable.

As part of the above study, duplicate injections of one bag were performed. Results of these injections show an 11 percent difference is attainable for the components of interest.

Additionally, a brief verification of the sample dilution technique was performed. A 500 ml gas bulb was spiked with MC at a concentration of 133 mg/l and subsequently diluted 1:1000 in a Tedlar bag. The dilution was analyzed by GC/ECD with a resultant concentration within 1 percent of the nominal concentration calculated.

APPENDIX

ALLIANCE TECHNOLOGIES CORPORATION

Validation of Soil Gas and Extracted Process Air Analysis by GC/FID

A method validation was performed in support of the GC/FID analysis procedure to be utilized for the Terra Vac Inc. SITE demonstration project at Groveland, MA. The purpose of the validation was to generate precision and accuracy goals for sample analysis using this technique.

Standards in tedlar bags were prepared in triplicate at three concentration levels for the five components of interest; methylene chloride (MC), trans 1,2-dichloroethylene (DCE), 1,1,1-trichloroethane (TRI), trichloroethylene (TCE) and tetrachloroethylene (PCE). All bags were spiked with a standard mixture independently prepared from the standards used to calibrate the instrument for analysis. Gas from each bag was injected onto a 1 ml heated gas sampling loop using a 50 ml gas-tight syringe. Response data was collected from the GC/ECD analysis and concentrations calculated using a linear regression analysis derived from a five-point calibration curve. Results are presented below:

Compoment	Concentration (ug/ml)	Percent Recovery Bag 1	Percent Recovery Bag 2	Percent Recovery Bag 3
MC	3.0	102	120	76
DCE	1.1	101	117	91
TRI	0.61	96	103	74
TCE	1.3	100	96	73
PCE	0.74	104	82	73
MC	0.60	103	86	77
DCE	0.23	104	87	80
TRI	0.12	127	112	106
TCE	0.27	89	73	67
PCE	0.15	113	104	91
MC	0.12	107	100	111
DCE	0.046	116	108	133
TRI	0.024	80	75	120
TCE	0.053	75	67	103
PCE	0.030	225	200	325

Review of the above results indicates that recoveries are between 65 and 130 percent recovery for all compounds. Recovery data from the bag at the lowest concentration show that although these components are detectable at the 0.2 to 0.3 ug/ml level, the quantitation is not reliable.

ALLIANCE TECHNOLOGIES CORPORATION

STANDARD OPERATING PROCEDURE

Analysis of Volatile Organic Compounds in Soil Gas and Extracted Process Air using GC/ECD

1.0 Scope and Application

This method is intended for use in the analysis of soil gas or extracted air, collected in Tedlar bags or in glass and Teflon gas-tight syringes, for chlorinated volatile organics. The following sections present procedural information detailing this analysis. Appended to this document are the results of a validation study conducted on the following components:

Methylene chloride (MC)
trans 1,2-Dichloroethylene (DCE)
1,1,1-Trichloroethane (TRI)
Trichloroethylene (TCE)
Tetrachloroethylene (PCE)

Application of this method to any other chlorinated volatile organic must be verified before use.

2.0 Apparatus and Materials

- Hewlett-Packard 5890 gas chromatograph equipped with Ni63 electron capture detector (ECD), heated gas sampling valve and 1.0 ml gas sampling loop.
- HP 3392 integrator (or equivalent)
- Glass column (6 ft by 2 mm ID) packed with 1% SP 1000 on 60/80 mesh Carbopack B
- Glass 500 ml gas sampling bulbs
- Tedlar bags with Teflon septa and stainless steel valves
- 100 ml gas flow metering bulb
- Assorted glass gas-tight syringes - 1.0 ml, 5.0 ml, 250 ul
- Assorted liquid syringes - 10 ul, 100 ul

3.0 Calibration Standard Preparation

3.1 Stock Standards

Prepare the following in a 5 ml vial with Teflon-lined screw cap:

Stock M		Concentration	
MC	2.0 ml	MC	0.663 mg/ul
TDE	2.0 ml	DCE	0.628 mg/ul
Stock N			
TRI	3.0 ml	TRI	1.236 mg/ul
TCE	0.050 ml	TCE	0.0225 mg/ul
PCE	0.20 ml	PCE	0.0998 mg/ul
Stock O			
"M"	1.0 ml		
"N"	0.015 ml		
		MC	650 ug/ul
		DCE	620 ug/ul
		TRI	18.3 ug/ul
		TCE	0.33 ug/ul
		PCE	1.47 ug/ul

All reference standards must be Chem Service 97% active (or equivalent). Corrections for percent activity must be applied when lot is below 98% active.
Cross contamination must be minimized by carefully rinsing syringes with organic-free water and baking at a minimum temperature of 50 degrees C for 30 minutes before use.

Stock standards are to be stored in glass vials with a minimum of headspace. Vials must be refrigerated at 4 degrees when not in use. Stocks must be prepared at a 60 day frequency, or sooner, if degradation is noted.

3.2 Stock Gas Standard Preparation

A gas standard stock is prepared in a 500 ml Glass bulb which has been heated in a 105 degree oven for 30 minutes and repeatedly purged with UHP nitrogen. Prior to use, the bulb volume should be verified by determining its aqueous capacity. A 50 ul aliquot of Stock "O" is injected into the bulb and allowed to equilibrate at room temperature for 15 minutes. Aliquots of this bulb are removed for preparation of calibration standards in Tedlar bags. No more than 10 ml of gas should be removed from a bulb in order to prevent dilution of the bulb concentration. Prepared in this manner, the concentration of the bulb is the following:

MC	65 ug/ml
DCE	62 ug/ml
TRI	1.83 ug/ml
TCE	0.033 ug/ml
PCE	0.147 ug/ml

3.3 Calibration Gas Standard Preparation

A minumum of three calibration standards are prepared by dilution of the bulb stock into 1 l Tedlar bags filled with 1000 ml of UHP nitrogen. Once prepared, bags are maintained, protected from light, for a period not to exceed 48 hours. After expiration, new bags must be generated from a freshly prepared stock bulb. The following are the bag standards to be used:

100X-- 10.0 ml of stock bulb into 1000 ml nitrogen

200X-- 5.0 ml of stock bulb into 1000 ml nitrogen

500X-- 2.0 ml of stock bulb into 1000 ml of nitrogen

1000X-- 1.0 ml of stock bulb into 1000 ml of nitrogen

2000X-- 0.5 ml of stock bulb into 1000 ml of nitrogen

Generation of these dilutions will result in the following concentrations:

Component	Concentration (ng/ml)				
	100X	200X	500X	1000X	2000X
MC	650	320	130	65	32
DCE	620	310	120	62	31
TRI	18	9.2	3.7	1.8	0.92
TCE	3.3	0.16	0.066	0.033	0.016
PCE	1.5	0.74	0.29	0.15	0.074

Additional calibration standards may be prepared as required. Acceptable linearity for some compounds has been achieved with bags at 4000X and 20X.

4.0 Instrument Calibration

Initial calibration is accomplished by the injection of three calibration standards from the calibration range listed above. Injections are performed by piercing the septum of the Tedlar bag with the needle of a pre-cleaned 50-ml gas-tight syringe and withdrawing approximataely 20 ml. The syringe needle is then pushed through the septum of the gas sampling valve, and the plunger depressed to flush the loop with 5 to 10 ml of gas. The valve is then changed to the on-column position to inject the gas onto the gas chromatograph. Chromatographic conditions are listed below:

Injection temp.	110 degrees C
Valve temp.	100 degrees C
Column temp.	50 to 175 degrees at 8 deg/min
ECD temp.	300 degrees C
Carrier flow	30 ml/min. argon/methane
Run time	25 min.

Calibration curves are generated by plotting area counts versus concentration via a linear regression analysis. Acceptance of initial calibration is based on achievement of a correlation coefficient of 0.99 or above.

Daily calibration is accomplished by verifying a single mid-range point of the calibrataion curve. Acceptance of continuing calibration is achievement of 20 per cent difference with the initial curve. Recalibration is required if the continuing calibration check is unacceptable.

Typical retention times for the components studied under the above conditions are:

MC	4.9 min.
DCE	9.9 min.
TRI	12.5 min.
TCE	15.7 min.
PCE	21.7 min.

5.0 Analysis of Samples

Sample analysis is initiated as soon as possible after collection. Samples are analyzed by injecting filled syringes into the gas sampling valve in the same manner used for standards. Component identification is accomplished by matching retention times of peaks in sample injections to those of components in calibration standards. A 3% window for identification is applied. Quantitation of identified components is achieved via linear regression analysis of the area count response .

Sample concentrations must be bracketed by standards. If a sample exceeds the calibrated range additional standards must be injected. If the sample response exceeds the linear range of the detector or integrator, the sample must be diluted. Dilution is performed by injecting a minumum of 10 ml from the syringe into a Tedlar bag filled with a known volume of UHP nitrogen.

Minimum detection limits for this analysis are the following:

MC	3 ng/ml
DCE	6 ng/ml
TRI	0.09 ng/ml
TCE	0.008 ng/ml
PCE	0.04 ng/ml

Upper and lower quantitation limits are provided below:

	Upper limit	Lower limit
MC	2000 ng/ml	5 ng/ml
DCE	2000 ng/ml	9 ng/ml
TRI	90 ng/ml	0.14 ng/ml
TCE	10 ng/ml	0.012 ng/ml
PCE	4 ng/ml	0.06 ng/ml

6.0 Quality Control

Quality control requirements for this analysis include the following:

- Method blanks -- one injection per day of a blank bag or syringe filled with UHP nitrogen.

- Duplicate analysis -- duplicate injection of one in every five samples with a maximum of two per 24 hour period.

- Laboratory Control Samples (LCS) -- analysis of one LCS per 20 program samples. An LCS consists of an injection of an independently prepared bag standard, containing the five components of interest. Suggested for use is the following:

Stock X		Concentration(mg/ul)
TRI	1.5 ml	1.24
TCE	0.025 ml	0.023
PCE	0.10 ml	0.099
Stock Y		
MC	1.0 ml	0.76
DCE	0.75 ml	0.54

Stock XY		Concentration (mg/ul)	
"Y"	0.5 ml		
"X"	0.0050 ml		
		MC	750
		DCE	530
		TRI	12.2
		TCE	0.22
		PCE	0.99

Bulb Stock (50 ul "XY")

Concentration (ug/ml)	
MC	75
DCE	53
TRI	1.2
TCE	0.022
PCE	0.099

LCS Bag
(5.0ml Bulb Stock/1000ml)

Concentration (ng/ml)	
MC	370
DCE	270
TRI	6.1
TCE	0.11
PCE	0.50

Recoveries for the five compounds in the LCS must be in the range of 80 to 140 percent for acceptable performance.

ALLIANCE TECHNOLOGIES CORPORATION

STANDARD OPERATING PROCEDURE

Analysis of Volatile Organic Compounds in Soil Gas and Extracted Process Air using GC/FID

1.0 Scope and Application

This method is intended for use in the analysis of soil gas or extracted air, collected in Tedlar bags or in glass and Teflon gas-tight syringes, for chlorinated volatile organics. The following sections present procedural information detailing this analysis. Appended to this document are the results of a validation study conducted on the following components:

Methylene chloride (MC)
trans 1,2-Dichloroethylene (DCE)
1,1,1-Trichloroethane (TRI)
Trichloroethylene (TCE)
Tetrachloroethylene (PCE)

Application of this method to any other chlorinated volatile organic must be verified before use.

2.0 Apparatus and Materials

- Perkin Elmer 3920 gas chromatograph equipped with a flame ionization detector (GC/FID), heated gas sampling valve and 1 ml gas sampling loop.
- HP 3392 integrator (or equivalent)
- Glass column (6 ft by 2 mm ID) packed with 1% SP 1000 on 60/80 mesh Carbopack B
- Glass 500 ml gas sampling bulbs
- Tedlar bags with Teflon septa and stainless steel valves
- 100 ml gas flow metering bulb
- Assorted glass gas-tight syringes - 1.0 ml, 5.0 ml, 250 ul
- Assorted liquid syringes - 10 ul, 100 ul

3.0 Calibration Standard Preparation

3.1 Stock Standards

Prepare the following in a 5 ml vial with Teflon-lined screw cap:

Stock A		Concentration (mg/ul)	
MC	250 ul	MC	0.265
DCE	250 ul	DCE	0.251
TRI	250 ul	TRI	0.268
TCE	250 ul	TCE	0.293
PCE	250 ul	PCE	0.324

All reference standards must be Chem Service 97% active (or equivalent). Corrections for percent activity must be applied when lot is below 98% active.

Cross contamination must be minimized by carefully rinsing syringes with organic-free water and baking at a minimum temperature of 50 degrees C for 30 minutes before use.

Stock standards are to be stored in glass vials with a minimum of headspace. Vials must be refrigerated at 4 degrees when not in use. Stocks must be prepared at a 60 day frequency, or sooner, if degradation is noted.

3.2 Calibration Gas Standard Preparation

A minumum of three calibration standards are prepared by dilution of the Stock A into 1 l Tedlar bags filled with 1000 ml of UHP nitrogen. Once prepared, bags are maintained, protected from light, for a period not to exceed 48 hours. After expiration, new bags must be generated. The following are the bag standards to be used:

- 1.0 ul of Stock A into 1000 ml nitrogen
- 2.0 ul of Stock A into 1000 ml nitrogen
- 5.0 ul of Stock A into 1000 ml nitrogen
- 10 ul of Stock A into 1000 ml nitrogen
- 20 ul of Stock A into 1000 ml nitrogen
- 50 ul of Stock A into 1000 ml nitrogen

Generation of these dilutions will result in the following concentrations:

Component	Concentration (ug/ml) 1 ul	2 ul	5 ul	10 ul	20 ul	50 ul
MC	0.26	0.53	1.3	2.6	5.3	13
DCE	0.25	0.50	1.3	2.6	5.0	13
TRI	0.27	0.54	1.3	2.7	5.4	13
TCE	0.29	0.59	1.5	2.9	5.9	15
PCE	0.32	0.65	1.6	3.2	6.5	16

4.0 Instrument Calibration

Initial calibration is accomplished by the injection of three calibration standards from the calibration range listed above. Injections are performed by piercing the septum of the Tedlar bag with the needle of a pre-cleaned 50-ml gas-tight syringe and withdrawing approximataely 20 ml. The syringe needle is then pushed through the septum of the gas sampling valve, and the plunger depressed to flush the loop with 5 to 10 ml of gas. The valve is then changed to the on-column position to inject the gas onto the gas chromatograph. Chromatographic conditions are listed below:

Injection temp.	125 degrees C
Valve temp.	100 degrees C
Column temp.	50 to 180 degrees at 8 deg/min
FID temp.	250 degrees C
Carrier flow	30 ml/min. helium
Run time	30 min.

Calibration curves are generated by plotting area counts versus concentration via a linear regression analysis. Acceptance of initial calibration is based on achievement of a correlation coefficient of 0.99 or above.

Daily calibration is accomplished by verifying a single mid-range point of the calibrataion curve. Acceptance of continuing calibration is achievement of 20 per cent difference with the initial curve. Recalibration is required if the continuing calibration check is unacceptable.

Typical retention times for the components studied under the above conditions are:

MC	5.6 min.
DCE	11.5 min.
TRI	14.4 min.
TCE	17.8 min.
PCE	24.7 min.

5.0 Analysis of Samples

Sample analysis is initiated as soon as possible after collection. Samples are analyzed by injecting filled syringes into the gas sampling valve in the same manner used for standards. Component identification is accomplished by matching retention times of peaks in sample injections to those of components in calibration standards. A 3% window for identification is applied. Quantitation of identified components is achieved via linear regression analysis of the area count response .

Sample concentrations must be bracketed by standards. If a sample exceeds the calibrated range additional standards must be injected. If the sample response exceeds the linear range of the detector or integrator, the sample must be diluted. Dilution is performed by injecting a minumum of 10 ml from the syringe into a Tedlar bag filled with a known volume of UHP nitrogen.

Minimum detection limits for this analysis are the following:

MC	0.03 ug/ml
DCE	0.02 ug/ml
TRI	0.02 ug/ml
TCE	0.02 ug/ml
PCE	0.03 ug/ml

Upper and lower quantitation limits are provided below:

	Upper limit	Lower limit
MC	13 ug/ml	0.1 ug/ml
DCE	13 ug/ml	0.1 ug/ml
TRI	13 ug/ml	0.1 ug/ml
TCE	15 ug/ml	0.1 ug/ml
PCE	16 ug/ml	0.1 ug/ml

6.0 Quality Control

Quality control requirements for this analysis include the following:

- Method blanks -- one injection per day of a blank bag or syringe filled with UHP nitrogen.

- Duplicate analysis -- duplicate injection of one in every five samples with a maximum of two per 24 hour period.

- Laboratory Control Samples (LCS) -- analysis of one LCS per 20 program samples. An LCS consists of a injection of an independently prepared bag standard, containing the five components of interest. Suggested for use is the following:

Stock B		Concentration (mg/ul)
MC	250 ul	0.603
DCE	100 ul	0.228
TRI	50 ul	0.122
TCE	100 ul	0.266
PCE	50 ul	0.148

LCS Bag
(5.0 ul Stock B /1000ml)

	Concentration (ug/ml)
MC	3.0
DCE	1.1
TRI	0.61
TCE	1.3
PCE	0.74

Recoveries for the five compounds in the LCS must be in the range of 65 to 130 percent for acceptable performance.